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BOTSWANA EMERGENCY WATER SECURITY AND EFFICIENCY PROJECT

SOWA WATER SUPPLY SCHEME

**ENVIRONMENTAL AND SOCIAL IMPACT ASSESSMENT AND
ENVIRONMENTAL AND SOCIAL MANAGEMENT PLAN REPORT**

SEPTEMBER 2022

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A B B R E V I A T I O N S	
AADD	Average Annual Daily Demands
AD	Anno Domini
AIA	Archaeological Impact Assessment
AIDS	Acquired Immune Deficiency Syndrome
ARV	Anti-Retroviral
BEWSEP	Botswana Emergency Water Security and Efficiency Project
BAIS	Botswana Aids Impact Survey
BFTU	Botswana Federation of Trade Unions
BH	Borehole
BOBs	Botswana Bureau of Standards
BOS	Botswana Standards
CBO	Community Based Organisation
CCPP	Calcium Carbonate Precipitation Potential
CEDA	Citizen Entrepreneurial Development Agency
CITES	Convention on International Trade in Endangered Species
CLO	Community Liaison Officer
CoC	Codes of Conduct
CRC	Convention on the Rights of the Child
CSO	Central Statistics Office
DCP	Dynamic Cone Penetrometer
DDT	Dichlorodiphenyltrichloroethane
DEA	Department of Environmental Affairs
DFRR	Department of Forestry and Range Resources
DHMT	District Health Management Teams
DNMM	Department of National Museums and Monuments
DWA	Department of Water Affairs
DWMPC	Department of Waste Management and Pollution Control
DWNP	Department of Wildlife and National Parks
DRC	Dukwi Refugee Camp
EA	Environmental Assessment
EAPB	Environmental Assessment Practitioners Board
ECC	Environmental Compliance Certificate
ECOP	Environmental Codes of Practice
EIA	Environmental Impact Assessment
EHS	Environmental, Health and Safety
EMP	Environmental Management Plan
E&S	Environmental & Social
EPA	Environmental Protection Agency
ESHS	Environment Social Health and Safety
ESMP	Environmental and Social Management Plan
ESC	Enviro Solve Consultancy
ESIA	Environmental and Social Impact Assessment
ESS	Environmental and Social Standard
GBV	Gender-Based Violence
GCCT	Grievance Committee Compliance Team
GDP	Gross Domestic Product
GIDA	Gender and Inclusive Development Analysis
GM	Grievance Mechanism
GPS	Global Positioning System
GRC	Grievance Redress Committee
GRS	Grievance Redress System

HAC	Human Animal Conflict
HDPE	High Density Polyethylene
HSE	Health Safety and Environment
HIV	Human Immuno-Deficiency Virus
FIDIC	Federation Internationale des Ingenieurs-Conseil
IEC	Information and Education Campaign
IAP	Interested and Affected Party
ILO	International Labour Organisation
IMR	Infant Mortality Rate
IPP	Integrated Project Planning
ITCZ	Inter-Tropical Convergence Zone
ISPAAD	Integrated Support Programme for Arable Agriculture Development
IUCN	International Union for Conservation of Nature
IWRM	Integrated Water Resources Management
LIMID	Livestock Management and Infrastructure Development
LSA	Late Stone Age
MCCB	Moulded Case Circuit Breaker
MDG	Millennium Development Goals
MEWR	Mineral, Energy and Water Resources
MFEP	Ministry of Finance and Economic Planning
MNP	Makgadikgadi Pans National Park
MOWL	Maximum Operating Water Level
MP	Member of Parliament
Na	Sodium
NACA	National Aids Coordinating Agency
NDP	National Development Plan
NGO	Non-Government Organization
NOx	Nitrogen Oxides
NSC	North-South Carrier
NWMR	National Water Master Plan Review
NWMP	National Water Master Plan
NOD	Nicholas O'Dwyer
OHS	Occupational Health and Safety
OP	Operational Policy
OSL	Optically Stimulated Luminescence
PAP	Project Affected Person
PH	Potential Hydrogen
PLO	Project Liaison Officer
PPE	Personal Protective Equipment
PIU	Project Implementation Unit
PM	Particulate Matter
PM ₁₀	Particulate Matter of 10 microns in diameter or smaller
PPM	Parts Per Million
PTA	Parents Teachers Association
RAC	Rural Administration Centre
RADP	Remote Area Development Programme
RAP	Resettlement Action Plan
RE	Resident Engineer
RPF	Resettlement Policy Framework
RO	Reverse Osmosis
RST	Roan Selection Trust
SANS	South African National Standard
SADC	Southern African Development Community
SB	Statistics Botswana

SCADA	Supervisory Control and Data Acquisition
S&CD	Social and Community Development
SDI	Silt Density Index
SDG	Sustainable Development Goals
SEA	Sexual Exploitation and Abuse
SH	Sexual Harassment
SHE	Safety Health and Environment
SHEA	sexual harassment, exploitation and abuse
SHEQ	Safety, Health, Environmental and Quality
SIA	Social Impact Assessment
SO ₂	Sulphur Dioxide
STD	Sexually Transmitted Disease
STI	Sexually Transmitted Infection
SWSS	Sowa Water Supply Scheme
TDS	Total Dissolved Solids
TMP	Traffic Management Plan
TGLP	Tribal Grazing Lands Policy
TOC	Total Organic Carbon
TOR	Terms of Reference
UNHCR	United Nations High Commissioner for Refugees
UNDRIP	United Nations Declaration on the Rights of Indigenous Peoples
UNPF11	United Nation Permanent Forum on Indigenous Peoples Issues
VAC	Violence Against Children
VC	Vulnerable Community
VCP	Vulnerable Communities Plan
VDC	Village Development Committee
VFD	Variable Frequency Drive
VHC	Village Health Committee
WAB	Water Apportionment Board
WB	World Bank
WENELA	Witwatersrand Native Labour Association
WHO	World Health Organisation
WMA	Wildlife Management Area
WSRP	Water Sector Reforms Programme
WTP	Water Treatment Plant
WUC	Water Utilities Corporation
WW	Water Works
WWTW	Wastewater Treatment Works

GLOSSARY OF TERMS

Air Pollutant: Any substances in air that could, in high enough concentration, harm human beings, other animals, vegetation, or material. Pollutants may include almost any natural or artificial composition of matter capable of being airborne.

Air Pollution: The presence of contaminating or pollutant substances in the air that do not disperse properly and interfere with human health or welfare or produce other harmful environmental effects.

Beneficiaries: Individuals, communities, and/or organizations expected to benefit from the project or program.

Compensation: Payment in cash or in kind for an assets or resource that is acquired or Affected by a project at the time the asset needs to be replaced.

Cattle Post: An unfenced rangeland where there are central watering points. The cattle owners do not usually reside in the cattle-post but have their employees' (cattle herders) families living there.

Destitute Person: An individual who, due to disabilities or chronic health condition, is unable to engage in sustainable economic activities and has insufficient assets and income sources, or an individual who due to old age, mental or physical disability, emotional or psychological disability or being a terminally ill patient, and having no means of support, is incapable of engaging in a sustainable economic activity and has unreliable and limited sources of income.

Dump: A site used to dispose of solid wastes without environmental controls.

Emission: Pollution discharged into the atmosphere from smokestacks, other vents, and surface areas of commercial or industrial facilities, from residential chimneys; and from motor vehicle, locomotive, or aircraft exhausts.

Environmental and Social Impact Assessment (ESIA): An instrument to identify and assess the potential environmental and social impacts of a proposed project, evaluate alternatives, and design appropriate mitigation, management, and monitoring measures.

Empowerment: The expansion of assets and capabilities of poor people to participate in, negotiate with, influence, control, and hold accountable institutions that affect their lives. In its broadest sense, empowerment is the expansion of freedom of choice and action. It is a participatory process which places or transfers decision-making responsibility and the resources to act into the hands of those who will benefit. This can include (i) capacity building for stakeholder organizations; (ii) strengthening legal status of stakeholder organizations; (iii) stakeholder authority to manage funds, hire and fire workers, supervise work, and procure materials; (iv) stakeholder authority to certify satisfactory completion of project and establish monitoring and evaluation indicators and (v) support for new and spontaneous initiatives by stakeholders.

Environmental and Social Impacts: Any change, potential or actual, to: (i) the physical, natural, or cultural environment, and (ii) impacts on surrounding community and workers, resulting from the project activity to be supported.

Gender: Refers to the socially constructed roles ascribed to males and females and the resulting socially determined relations. These roles are learned, change over time, and vary widely within and across cultures. Gender is one of the key entry points for social analysis/ assessment. It is important

to understand the social, economic, political, and cultural forces that determine how men and women participate in, benefit from, and control project resources and activities. A good analysis would highlight gender specific constraints, risks and opportunities.

Gender Based Violence (GBV): An umbrella term for any harmful act that is perpetrated against a person's will and that is based on socially ascribed (i.e. gender) differences between males and females. It includes acts that inflict physical, sexual or mental harm or suffering, threats of such acts, coercion, and other deprivations of liberty. These acts can occur in public or in private. The term Gender Based Violence (GBV) is used to underscore systemic inequality between males and females (which exists in every society in the world) and acts as a unifying and foundational characteristic of most forms of violence perpetrated against women and girls.

Grievance Procedures (including Grievance Mechanism or GM): The processes established under law, local regulations, or administrative decision to enable project-affected people, property owners and other displaced persons to redress issues related to acquisition, compensation, or other aspects of resettlement or pertaining to social and environmental concerns and issues related to the implementation (and all phases) of the project. In Bank funded projects, such procedures are implemented at project-level to address project-level concerns and issues, and improve sustainability and community engagement in the project, but does not preclude the use of other administrative processes.

Groundwater: The supply of fresh water found beneath the Earth's surface (usually in aquifers), which is often used for supplying wells and springs.

Involuntary Land Acquisition: The taking of land by Government or other Government agencies for compensation, for the purposes of a public project against the will of the landowner. The landowner may be left with the right to negotiate the amount of compensation proposed. This includes land or assets for which the owner enjoys uncontested customary rights.

Kgosi: Traditional leader or chief of a ward/settlement (Plural is Dikgosi).

Kgotla or Customary Court: Name given to the place for community meetings and customary court hearings in a ward/settlement (Plural is Dikgotla).

Kgotla Meeting: A public meeting held at the Kgotla, in the presence of a Kgosi or his representative. All individuals are encouraged to speak freely and openly as it upholds the idea of equality.

Kitsiso: Setswana meaning information or knowledge.

Land: The surface of the earth consisting of soil and things permanently attached to surface, including land-based natural resources such as forests. This is the general rule, but the extent of 'land' differs from country to country. In this context, land refers to agricultural and/or non-agricultural land and any structures thereon whether temporary or permanent and which may be required for the Project.

Land Acquisition: The process of acquiring land under the legally mandated procedures of eminent domain. This includes all methods of obtaining land for project purposes, which may include outright purchase, expropriation of property and acquisition of access rights, such as easements or rights of way. Land acquisition may also include: (a) acquisition of unoccupied or unutilized land whether or not the landholder relies upon such land for income or livelihood purpose; (b) repossession of public land that is used or occupied by individual households; and (c) project impacts that result in land being submerged or otherwise rendered unusable or inaccessible.

Land Expropriation: The compulsory taking of land by the State, in exercise of its power of eminent domain. The process whereby a person is compelled by a public agency to alienate all or part of the land and fixed assets s/he owns or possesses, to the ownership and possession of that agency, for a public purpose, in return with compensation at replacement value.

Livelihood Restoration and Rehabilitation: A term often used to describe the process of re-establishing lifestyles and livelihoods following resettlement.

Monitoring: The process of repeated observations and measurements of environmental and social quality parameters to assess and enable changes over a period of time.

Mosarwa: Singular for a person who is Basarwa (San). In this project they meet the criteria of Vulnerable Communities as per World Bank OP 4.10.

Permit: An authorization, license, or equivalent control document issued by an approved agency to implement the requirements of an environmental regulation, e.g., a permit to operate a wastewater treatment plant or to operate a facility that may generate harmful emissions.

Potable Water: Water that is safe for drinking and cooking.

Project Area: It is the location of all project works areas which includes Sowa Town, BotAsh Mine, Dukwi Refugee Camp, and the villages of Kutamogoree, Moseitse, Dukwi, Nata, Maposa, Manxotae and Sepako.

Project Affected Person or Persons (PAPs): Any person or persons who, for reasons of the involuntary taking or voluntary contribution of their land and other assets under the project, result in direct economic and or social adverse impacts, regardless of whether the said Project affected persons physically relocate. These people may have their: i) standard of living adversely affected, whether or not the Project Affected Person must move to another location; ii) right, title, interest in any house, land (including premises, agricultural and grazing land) or any other fixed or movable asset acquired or possessed, temporarily or permanently, adversely affected; iii) access to productive assets adversely affected, temporarily or permanently; or iv) business, occupation, work or place of residence or habitat adversely affected.

Public Consultation: The process of engaging affected people and other interested parties in open dialogue through which a range of views and concerns can be expressed to inform decision-making and help build consensus. To be meaningful, consultation should be carried out in a culturally appropriate manner, with information in local languages distributed in advance.

Radiation: Any form of energy propagated as rays, waves, or steams of energetic particles. The term is frequently used in relation to the emission of rays from the nucleus of an atom.

Recycle/Reuse: The process of minimizing the generation of waste by recovering usable products that might otherwise become waste. Examples are the recycling of aluminium cans, paper, and bottles.

Rehabilitation or Livelihood Assistance: The provision of development assistance in addition to compensation such as land preparation, credit facilities, training, or job opportunities, needed to enable project affected persons to improve their living standards, income earning capacity and production levels; or at least maintain them at pre-project levels.

Resettlement Action Plan (RAP): The document in which the responsible entity specifies the procedures that it will follow and the actions that it will take to mitigate adverse effects, compensate losses, and provide development benefits to persons and communities affected by an investment project. RAPs are prepared by the Government to address such impacts. RAPs contain specific and legally binding requirements to be abided by to resettle and compensate the affected party before implementation of the project activities causing adverse impacts.

Runoff: That part of precipitation, snowmelt, or irrigation water that runs off the land into streams.

Smoke: Particles suspended in air after incomplete combustion of materials.

Solid Wastes: No liquid, non-soluble materials, ranging from municipal garbage to industrial wastes that contain complex, and sometimes hazardous, substances. Solid wastes include sewage sludge, agricultural refuse, demolition wastes, and mining residues. Technically, solid wastes also refer to liquids and gases in containers.

Socio-Economic Survey (SES): An accurate survey of the project-affected population. The survey focuses on income-earning activities and other socioeconomic indicators.

Stakeholders: All individuals, groups, organizations, and institutions interested in, and potentially affected by a project, and/or having the ability to influence a project.

Violence Against Children (VAC): Physical, sexual, neglect or negligent treatment of children under the age of 18. Violence against children can manifest itself almost anywhere (in the home, within the community and at the workplace).

Vulnerable Communities: A term that refers to those who meet the criteria of OP 4.10 (Indigenous Peoples Policy of the World Bank) in Botswana. They are social groups with identities that are often distinct from dominant groups in their national societies, are frequently among the most marginalized and vulnerable segments of the population. As a result, their economic, social, and legal status often limits their capacity to defend their interests in and rights to lands, territories, and other productive resources, and/or restricts their ability to participate in and benefit from development. In line with the World Bank's Indigenous Peoples Policy (OP 4.10), vulnerable communities refers to a distinct, vulnerable, social and cultural group possessing the following characteristics in varying degrees: (a) self-identification as members of a distinct indigenous cultural group and recognition of this identity by others; (b) collective attachment to geographically distinct habitats or ancestral territories in the project area and to the natural resources in these habitats and territories; (c) customary cultural, economic, social, or political institutions that are separate from those of the dominant society and culture; and (d) an indigenous language, often different from the official language of the country or region.

Vulnerable Groups or Individuals: Those who by gender, ethnicity, age, physical or mental disability, economic disadvantage, religious affiliation, social status or other characteristics may be more adversely affected by project impacts. Vulnerability denotes a condition characterized by higher risk and reduced ability to cope with shock or negative impacts. It may be based on socio-economic condition, gender, age, disability, ethnicity, or other criteria that influence people's ability to access resources and development opportunities.

Vulnerable Communities Plan (VCP) (Indigenous Peoples Plan): As a compliance measure with OP4.10 on Indigenous Peoples, a Vulnerable Communities Plan (VCP) is prepared for any investment project which affects Vulnerable Communities. In this project, the term Vulnerable Communities will

be used to mean those communities who meet the criteria of Indigenous Peoples under OP 4.10. The Plan is designed to reflect culturally appropriate benefits and processes and is based on the full consideration of the options preferred by Vulnerable Communities affected by the project in a consultation process that respects the principles of free, prior, and informed consultation leading to broad community support. The Plan also includes provisions which ensure that institutions responsible for Government interaction with Vulnerable Communities should possess the social, technical and legal skills needed to carry out proposed development activities. Elements of a VCP include an assessment of the legal framework, collection of baseline data, examination of land tenure, strategy for local participation, design of mitigation measures and activities, assessment of institutional capacity, an implementation schedule and a system for monitoring and evaluation.

Water Pollution: The presence of enough harmful or objectionable material to damage water quality.

Executive Summary

1. Background

The Government of Botswana through Water Utilities Corporation (WUC) is undertaking the Botswana Emergency Water Security and Efficiency Project (BEWSEP) with funding from the World Bank (WB) at P1.45 billion (USD145 million). BEWSEP comprises several sub-projects and most of these sub-projects are in the northern part of Botswana. The sub-projects include critical water supply investments in water supply to urban and rural areas, that are needed to mitigate drought impacts (under Component 1), and wastewater treatment investments needed to comply with effluent standards and prevent pollution of vital downstream water sources (under Component 2). WUC is responsible for implementing the project and ensuring compliance with the environmental, social and procurement requirements of the WB. Sowa Water Supply Scheme is a sub-project under BEWSEP, it intends to improve availability of water supply and efficiency services in Sowa Township, the villages of Nata, Maposa, Manxotae, Sepako, Dukwi, Dukwi Refugee Camp, Moseitse and Kutamogoree, as well as the BotAsh Mine near Sowa. To actualize this infrastructure improvement, WUC engaged Enviro Solve Consultancy (Pty) Ltd (Enviro Solve Consultants) to conduct this ESIA and ESMP for the Sowa Water Supply Scheme. The environmental and social policies of the WB require the project to conduct an Environmental and Social Impact Assessment (ESIA) with an Environmental and Social Management Plan (ESMP) in line with World Bank's Operational Policy Procedures and Standards.

2. BEWSEP Description and Development Objective

Given the current low water security, limited-service coverage and high-water losses; the Government of Botswana applied for a loan with the World Bank for implementation of BEWSEP. The project will be implemented from 2017 to 2023. The project development objective is to improve availability of water supply in drought vulnerable areas, increase the efficiency of WUC, and strengthen wastewater management in selected systems. The three components of the project are:

Component 1: Improve availability of water supply and efficiency of services,

Component 2: Improve wastewater and sludge management; and

Component 3: Sector reform and institutional strengthening.

Sowa Water Supply Scheme (sub-project) is being implemented under Component 1. According to World Bank environmental screening, BEWSEP is classified as "Category A" because it is likely to have significant environmental impacts that are sensitive, diverse, or unprecedented. These impacts may affect an area broader than the sites or facilities subject to physical works. This ESIA study examines the sub-project's potential negative and positive environmental impacts, compares the feasible alternatives (including the "without project" situation) under the sub-project, and recommends management measures needed to either prevent, minimize, mitigate, or compensate for adverse impacts while improving environmental performance.

3. Project Description of Sowa Water Supply Scheme

The sub-project development objective is to improve availability of water supply in Sowa Township, the villages of Nata, Maposa, Manxotae, Sepako, Dukwi, Dukwi Refugee Camp, Moseitse and Kutamogoree, and the BotAsh Mine. This sub-project will improve water supply for about 24,192

(projected population for 2020) beneficiaries in the aforementioned localities, including a total of 4,658 (projected population for 2020) beneficiaries from vulnerable communities and Other Vulnerable and Disadvantaged Groups respectively (Manxotae, Dukwi Kutamogoree and Refugee Camp) and for a projected total of 35,433 beneficiaries by the year 2041 (See Table 1 for the disaggregated data). The Dukwi Wellfield is the main source of water supply in the Dukwi region, supplying the main population centres of Sowa Township, Nata and Dukwi villages. This is in addition to providing process water to BotAsh Mine in northern Botswana, a supplier of natural sodium products.

Table 1: Project Beneficiaries Projected from 2011 Census to 2021 and 2041

Village	Population (ex-Cities/Towns and Villages Projections 2020 Bots Gov) Derived from 2011 Census and Projected to 2020	Male and female 2020 Projection		Population of 2041 using an Average Growth rate of 1.9% per Year	Male and Female 2041 Projection	
		Male	Female		Male	Female
Sepako	808	396	412	1,200	588	612
Manxotae (Vulnerable Community)	762	373	389	1,131	554	577
Maposa	489	245	244	726	363	363
Nata	7,953	3,897	4,056	11,808	5,786	6,022
Sowa Township	4,262	2,259	2,003	6,328	3,354	2,974
Dukwi Refugee Camp (Other Vulnerable and Disadvantaged Groups)	1,000	500	500	1,000	500	500
Dukwi	4,073	2,077	1,996	6,047	3,084	2,963
Mosetse	2,117	1,143	974	3,143	1,697	1,446
Kutamogoree (Vulnerable Community)	2,728	1,255	1,473	4,050	1,863	2,187
Total Population of Beneficiaries	24,192	12,145	12,047	35,433	17,789	17,644
Total (Vulnerable Community)	4,658	2,373	2,606	6,907	3,280	3,627

The existing wellfield was developed in 1985 and is comprised of fifteen (15) boreholes. There are currently four operational boreholes, with an average output of 4.7 ML/day, at an average running duration of 22 hours per day (Table 2). The boreholes have an average depth of 100 m.

Table 2: Operational Boreholes

Borehole No.	Operational Yield (m ³ /hr)
BH 7675	60
BH 7678	65
BH 7687	45
BH 7647	50
Total	220 m³/hour

The proposed sub-project, entails the following new infrastructure:

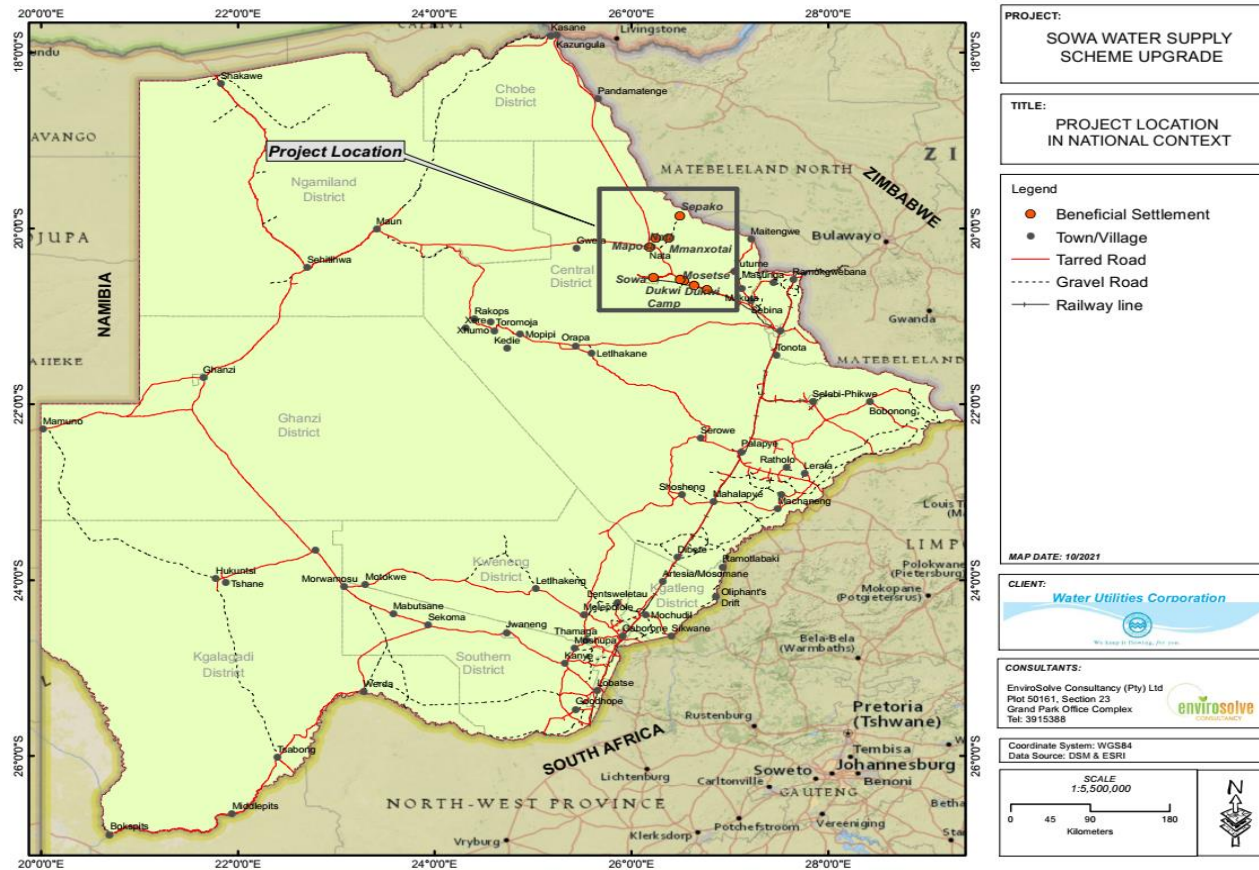
- Design and construction of pipelines including (start and end points of the pipeline are listed):
 - Dukwi Waterworks to Dukwi village with a take-off to Dukwi Refugee Camp
 - Dukwi village to Moseitse East
 - Moseitse East to Kutamogoree
 - Dukwi Waterworks to Nata Waterworks
 - Nata Waterworks to Manxotae with a take-off to Maposa
 - Manxotae to Sepako
 - Dukwi Waterworks to Sowa Waterworks
- Design and construction of infrastructure including
 - Elevated tank at Kutamogoree
 - Pump station at Moseitse East
 - Elevated tank at Dukwi East
 - Elevated tank at Dukwi Village
 - Pump station at Dukwi Waterworks
 - Ground level tank at Nata Waterworks
 - Elevated tank at Nata Waterworks
 - Pump station at Nata Waterworks
 - Control valve chamber to Maposa elevated tank
 - New elevated tank at Manxotae
- Design of the SCADA and telemetry system to link in with the existing system at Dukwi Water Works and wellfield. The following items will be monitored:
 - Flow rate, instantaneous and cumulative;
 - Pump delivery pressure;
 - Pump status, on/off;
 - Motor condition, current drawn, and
 - Water level in borehole
- Design and construction of Reverse Osmosis (RO) water treatment plant.
 - Brine disposal ponds
 - Associated civil works for installation of the modular RO units
 - Pipeline between the RO plant and the brine disposal ponds
 - Modular RO plant

Justification/Rationale of Sub-Project: According to the NWMPR (2006) the maximum sustainable daily abstraction from the Dukwi Wellfield is 3.9 ML/day. Therefore, the current abstraction of 4.7 ML/day on average is not a sustainable long-term water supply solution. This abstraction scenario is likely to result in encroachment of low quality (saline) ground water and aquifer depletion. The time series graphs show that the concentrations of Sodium (Na), Total Dissolved Solids (TDS) and Calcium (Ca) have increased over time, with the TDS and Na concentrations exceeding the BOS32:2015 drinking water quality standards (Nicholas O’Dwyer, 2021). The sub-project will therefore include a long-term sustainable abstraction solution to ensure that the water quality consistently meets the BOS32:2015 drinking water quality standards.

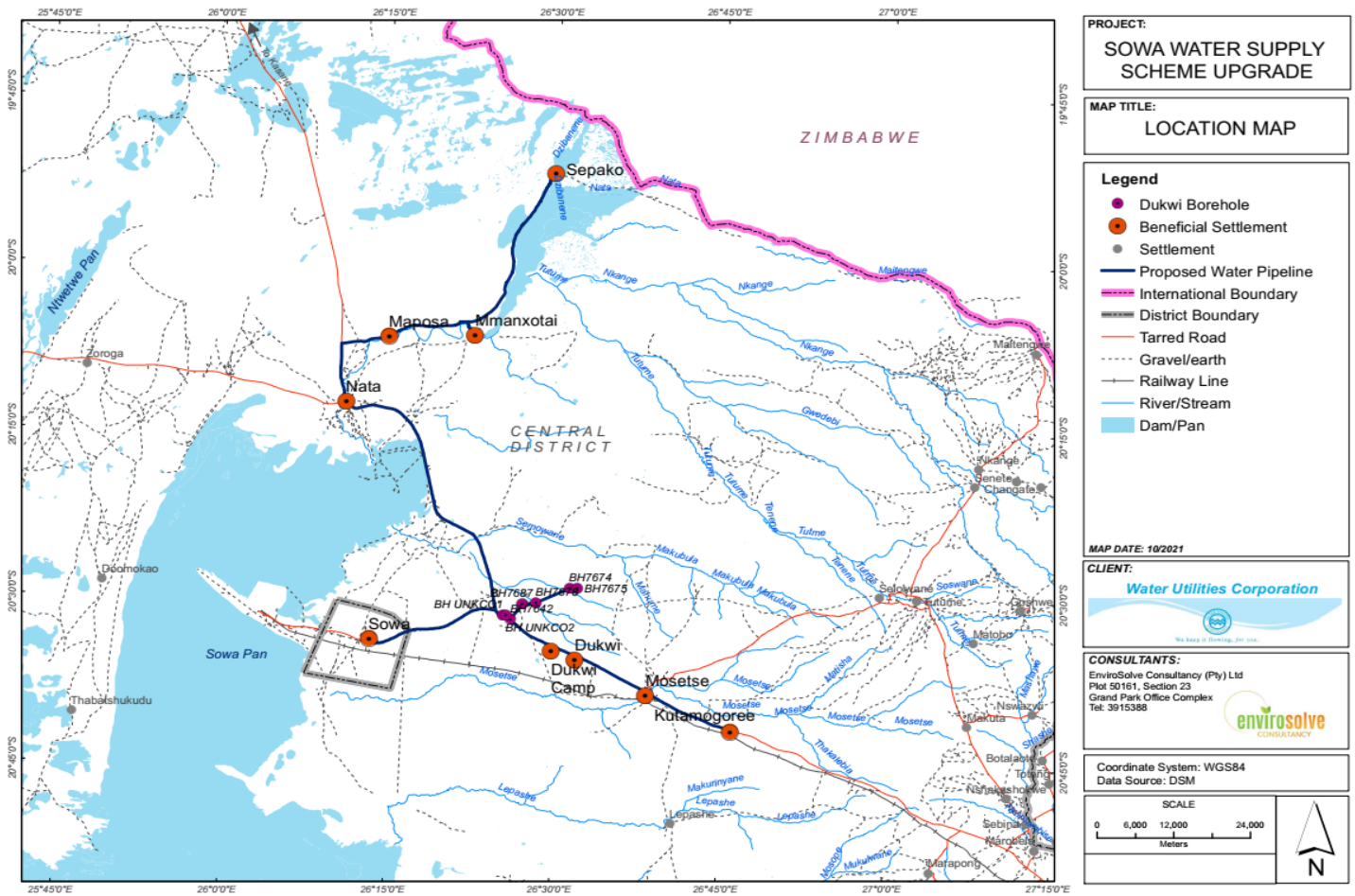
The water samples from the project boreholes also indicated microbiological activity, elevated TDS and Na concentrations, which exceeded the BOS32:2015 drinking water quality standards, indicating high salt content. Consultations with the project area communities also highlighted the high salt content of the water. Furthermore, the community mentioned damages to their appliances because

of clogging by impurities from the water. The same clogging affects water pipes, causes pipe bursts and results in water loss and water supply disruptions as reported and observed.

Project Location: The proposed Sowa Water Supply Scheme entails Sowa Township, the villages of Nata, Maposa, Manxotae, Sepako, Dukwi, Dukwi Refugee Camp, Moseitse and Kutamogoree, BotAsh Mine and Dukwi Wellfield. The project area is in the Central Tutume Sub-District which is part of the Central District of Botswana. The project areas are located between Kutamogoree and Sepako villages and accessible via the main A3 tarred road connecting Francistown City with the main tourism towns of Maun and Kasane (**Maps 1 and 2**).



Map 1: Project Location



Map 2: Regional Location

4. Project Area of Influence and Associated Facility

Project Beneficiaries: The beneficiaries of the water supply scheme for this sub-project are communities and households in Sowa Township, the villages of Nata, Maposa, Manxotae, Sepako, Dukwi, Dukwi Refugee Camp, Moseitse and Kutamogoree, and the BotAsh Mine. This sub-project will improve water supply for about 24,192 beneficiaries as projected for 2020 and 35,434 beneficiaries by the year 2041.

Access Roads. The main sub-project access road is the 86 km A3 tarred road from Kutamogoree to Maposa turn-off after Nata village. The other access road is a 51 km tarred road from Nata-Maposa turn-off to Sepako village. A 24.2 km tarred road is used to access Sowa Town from the main A3 road. A 12 km dirt road is used to access the boreholes at Dukwi Wellfield from the Dukwi Waterworks.

Land Requirements for the Project. The total land required for the sub-project is 98.37 Hectares and it entails the following:

- A total of approximately 190 km pipeline servitude that is 5 m wide to allow for the construction of all the project pipelines. The total land requirement for the pipelines is 95.0 Hectares.
- Plots for the sites for the new elevated tanks at Kutamogoree, Dukwi East, Dukwi Village and Manxotae will be applied for through the Ngwato Land Board via the Tutume and Nata Sub-Land Boards. The total land requirement for the elevated tanks 0.37 Hectares.
- Current information points to no resettlement, if during the project need arises for land expropriation for any private property RAP will be prepared along with the associated impacts.
- Temporary land required for contractor's camps will be applied for through the Ngwato Land Board via the Nata and Tutume Sub-Land Boards. The total land requirement for the contractor's camp and labourer's camp is 2 and 1 Hectares respectively.

5. Environmental and Social Impact Assessment (ESIA)

ESIA Study Objectives and Scope: Apart from aligning the proposed sub-project with the requirements of the World Bank's Operational Policies on Environmental Assessment (OP 4.01) and the national EA Act No. 10 of 2011, the overall purpose of this ESIA study will seek to:

- Assess and provide a description of the environmental and social baseline of the project area, including Vulnerable Communities (VC).
- Manage COVID-19 procedures/measures through a plan into the health and safety process of procurement documents and contracts. The guidelines on consultations during COVID 19, among others are specified in the ESMP.
- Identify and evaluate all potential archaeological, environmental, and social impacts and risks
- Develop an ESMP that contains management actions and mitigation measures to eliminate or reduce potential negative environmental impacts and enhance potential positive impacts, as well as for the monitoring of the required environmental and social management tools.
- Develop project mitigation measures, Codes of Conduct, Implementation of ESHS and OHS Standards, Preventing Sexual Exploitation and Abuse (SEA), Sexual Harassment (SH), and Violence Against Children and Environmental Codes of Practice (ECOP) that address the potential environmental and social impacts and risks of the sub-projects and ensure these are reflected in bidding documents and Contractor's ESMP. These should also address potential project impacts for vulnerable communities, marginalized groups, and individuals.

- Identify, provide mitigation and monitoring measures for social and environmental risks, with particular attention on vulnerable and disadvantaged individuals and groups.
- Propose costs, include a Grievance Mechanism (GM) and responsibilities for mitigation and monitoring.
- Identify and review the relevant legislative and planning requirements for the proposed sub-project.
- Undertake a public participation process with all the relevant stakeholders to inform them about the proposed project, and solicit and address their views and concerns about the project, as well as solicit their views on a project-level GM.
- Determine the environmental and social monitoring and reporting requirements, emergency response procedures, institutional or organization arrangements, and capacity development measures and budget to ensure the implementation of the ESMP.

ESIA Study Approach and Methodology. The study approach included a desktop review, reconnaissance survey, public and stakeholder consultations, analysis of alternatives, evaluation of impacts and development of mitigation measures and monitoring plan, code of conduct and public disclosure plans. The key study methodology is presented below:

Screening by World Bank: World Bank environmental screening classified the BEWSEP as “Category A” because it is likely to have significant environmental impacts that are sensitive, diverse, or unprecedented. The sub-project has thus also been assessed as a “Category A” project. These impacts may also affect areas broader than the sites or facilities subject to physical works. This Environmental and Social Impact Assessment (ESIA) will examine the sub-project's potential negative and positive environmental impacts, compares the feasible alternatives, and recommends appropriate measures to manage adverse impacts and improve environmental performance.

Literature Review. The review of existing literature, social and environmental baseline data information for the sub-project was obtained within the project area with the aim to familiarize the specialists with the project area. The review also served to contextualize how the greater area would be affected by the implementation of the sub-project.

Stakeholder Consultations.

- **Information Dissemination:** Appointments with the respective *Dikgosi* were made and confirmed through telephone calls.
- **Methods of Engagement:** Focus group meetings and Kgotla meetings were held with *Dikgosi*, VDC and communities (including vulnerable communities) at different dates and times to solicit views about the proposed sub-project.

6. Sub-Project Activities

The proposed sub-project assumes a four-tier approach i.e., the Pre-construction, Construction, Operation and the Decommissioning Phases, details of which are provided hereunder:

Pre-Construction Phase. The phase involves all preparatory activities associated with the proposed sub-project. This will include implementation of safety and health measures, codes of conduct related to COVID-19, SEA, SH, VAC and child labour. The current report is part of this phase and will facilitate governance of the project activities during the construction stage to promote environmental and social conservation.

During the pre-construction phase, WUC will undertake to find a suitable contractor to engage in implementation of the proposed sub-project works. The final ESIA report will form part of the bid documents. The pre-construction phase will take 4 months including the procurement of the contractor and mobilization to site.

Construction Phase. The Construction Phase is the stage wherein most of the proposed works will be actualized. The ESIA becomes critical for guiding, monitoring, or auditing of contractor activities on site to ensure compliance with the environmental and social management measures at this stage. Furthermore, most of the anticipated sub-project impacts on the environment will be realized during the construction phase. The construction phase is scheduled to take 12 months from award of the contractor for the works.

Operation Phase. Project operation commences after commissioning and hand-over to WUC to carry on daily activities of supplying water to the people of the project area and it has been designed for 20 years lifespan. The phase includes maintenance activities. This will include implementation of safety and health measures, including codes of conduct related to HIV/AIDS, COVID-19, SEA, SH and VAC and child labour.

Decommissioning (Construction and old infrastructure) Phase: Decommissioning follows the cessation of construction activities and prior to the commissioning of the sub-project. The Construction Phase ESIA Plan shall normally be extended to demonstrate the return of ambient conditions, as recorded during the sub-project's baseline monitoring programme, and confirm no unexpected adverse environmental impact due to the construction. The decommissioning phase will last for 3 months and it will be part of monitoring for Defects Liability Period which last 12 months.

Project Proposed Timelines and Estimated Costs

The project preparation has started with civil works expected to start in 2022 following due diligence to procurement and social and environmental impacts and risks. The pre-construction phase will take 4 months including procurement of the contractor and mobilization to site. The sub-project infrastructure will take 12 months to construct at a cost of about P 200 million (US\$ 20 million). The decommissioning phase will last 3 months while the defects liability period after construction is 12 months. The estimated budget for the ESMP is P6,126,395.00 (US\$ 612,639.50). The water supply scheme is envisaged and designed to sustainably supply the village beneficiaries with water for a period of 20 years.

7. Environmental and Social Safeguards Laws and Policies Relevant to the Sub-Project

This section presents applicable policies and laws relevant to the Sowa Water Supply Scheme sub-project along with gaps and suggested recommendations to close the gaps. The relevant World Bank policies that have been triggered by this sub-project are presented in **Table 3**; key Botswana environmental and social safeguards policies and laws relevant to the sub-project are outlined in **Table 4**; key international treaties and conventions relevant to vulnerable communities (**Table 5**); and gap analysis between the World Bank Safeguards and Botswana Environmental Act and regulations are presented in **Table 6**. The analysis of all the policies and laws did not identify any potential litigation issues against the project which may restrict the environmental appraisal.

Table 3: World Bank Policies Triggered by the Project and Relevance to the Sub-Project

World Bank Safeguards Operational Policy (OP) Triggered by the Botswana Emergency Water Security and Efficiency Project (BEWSEP)	Triggered by the Sowa Water Supply Scheme Sub-project	Remarks
OP 4.01 Environmental Assessment (including public participation)	Yes	Preliminary evaluation has identified potential negative environmental and social impacts, thus, there is a need for an environmental and social assessment to ensure appropriate mitigation measures are in place during all stages of the sub-project.
OP 4.11 Physical Cultural Resources	Yes	No sites of cultural or historical significance will be used for or affected by the sub-project. Notwithstanding, Chance Find Procedures are described in case of any discovery. Refer to Annex 11 for more details.
OP 4.12 Involuntary Resettlement	Yes	There will be no resettlement based on assessments so far but there is potential for economic displacement as a result of vendors along the pipeline route especially at Kutamogoree. However, if the vendors are to be disturbed in anyway, the necessary consultations will be held with them to consider the impacts of the relocations on their business. An agreement will be reached which favours their business. A RAP will be prepared based on this and the recently introduced Land Board charges on land expropriation.
OP4.10 Indigenous Peoples Policies	Yes	Three beneficiary villages and Dukwi Refugee Camp have Vulnerable Communities, the Basarwa (San) in Kutamogoree, Moseitse and Manxotae and refugees at Dukwi Refugee Camp. As per OP 4.10, an IPP (VCP) has to be prepared for the four communities.
OP/BP 4.37 Safety of Dams	No	The policy triggered at project level as some of the sub-projects have dams as the water source, but this sub-project has groundwater as the source.
OP/BP 7.50 Projects on International Waterways	No	The policy triggered at project level as two of the sub-projects have influence on international waterways, but this sub-project has not impact on international waterways.

Table 4: Key Botswana Environmental and Social Safeguards Policies and Laws Relevant to the Project

Legislation/Policy	Remarks
Environmental Assessment (EA) Act, 2011	The EA Act requires that all the developmental interventions be subject to an environmental impact assessment. Such interventions include both existing and proposed developments. The assessment must identify, evaluate, and mitigate impacts throughout the development life cycle, namely Pre-construction, Construction and Decommission.
Environmental Assessment Regulations, 2012	The Regulations provide guidance on how the EIA study should be presented (Form D & E, Regulations 7 and 8), including the content of the report.
Environmental Assessment Act, 2020	A revision on the EA Act, 2010, became operational on 1 st April 2021. The Act was amended to provide for shorter times for assessments, to provide reviewers including private reviewers and other related matters. The Project Brief will be reviewed in 3 days, the scoping report and Terms of Reference will

Legislation/Policy	Remarks
	be reviewed in 10 days, the EMP study will be reviewed in 10 days and the Environmental Impact Assessment will be reviewed in 14 days.
Tribal Land Act (1968) and Tribal Land (Amendment) Act, 1993	The Act is an important reference guide to the compensation procedures if uptake of parts of property is considered an option.
Acquisition of Property Act, 1971	This Act will come into effect as and when land is expropriated for the proposed water supply scheme. Reference should therefore be made to this Act during compensations that may be conducted by WUC and the Land Board in line with the EHS General Guidelines (Community Health and Safety), World Bank safeguards policies OP 4.10 and 4.12 as well as the Resettlement Policy Framework of 2017.
Domestic Violence Act, 2008	This Act is important to this ESIA because where there is employment opportunities and influx of labour in the community a number of social ills occurs, and domestic violence becomes one of them.
Employment Act, 2010	The Act makes provision for regulating employment and labour issues regarding promoting harmonized relations between employer and employee and it is relevant for this sub-project to resolve labour disputes.
Factories Act, 1979	Seeks to ensure the welfare, health and safety of workers and the beneficiary community members. It also seeks to ensure the safety of machinery used in the project site.
Monuments and Relics Act, 2001	It is in this regard that the importance of a detailed Archaeological Impact Assessment is emphasized for the proposed project and WUC has to establish the presence and/or absence of archaeological sites within and around the project area.
Wildlife Conservation and National Parks Act, 1992	It is illegal to hunt or capture any animal in an area declared to be a reserved area under the Forest Act, except in accordance with a permit, authorization as may be required by the Act. Any person who contravenes the provisions of this Act shall be fined.
Affirmative Action Framework for Remote Area Communities, 2014	During sub-project implementation this Framework will promote equal opportunities for remote area communities living in the sub-project area. It will be instituted by Government officers to ensure that sub-project village residents are included in all national programmes by addressing all identified imbalances and improving their livelihoods.
Revised National Policy on Rural Development, 2002	It is recommended that the contractor together with WUC come up with programmes, to give back to the community as indicated in objective 9, so as to reduce rural poverty and to improve livelihoods.
Children's Act, 2009	The development and implementation of the ESIA should consider the requirements of this policy in relation to the promotion and protection of the rights of the children in the vulnerable communities.
Revised Guidelines for Implementation of Ipelegeng Programme (2012) (Labour Based Public Works Programme)	Ipelegeng (Government Labour-based Public Works Programme) is the main source of employment for the semi-skilled and unskilled Batswana. In some settlements, Basarwa, who are not benefiting from the social safety nets, depend on Ipelegeng for survival.
Botswana Vision, 2036	The prime objective of the Vision is delivery of prosperity for all and ensuring that every Motswana enjoys a dignified livelihood. The Sowa Water Supply Scheme sub-project will align to Vision 2036's two pillars being: Sustainable Economic Development and Human and Social Development.

Table 5: Key International Treaties and Conventions Relevant to Vulnerable Communities

Treaty/Convention	Relevance to Vulnerable Communities
ILO Convention on Indigenous and Tribal Peoples	1. This international Convention spells out that self-identification as Indigenous Peoples is essential for determining the groups to which the provisions of this Convention apply. It also emphasizes inclusive decision-making of Indigenous

	Peoples in matters that affect them, and recognizes the cultures, traditions of Indigenous Peoples. 2. Governments shall have the responsibility for developing, with the participation of the peoples concerned, protect the rights of these peoples and to guarantee respect for cultures.
African Commission on Human and Peoples Rights Working Group on Indigenous Peoples Report on Indigenous Peoples in Africa, 2005	This regional report helps elucidate the understanding of Indigenous Peoples in the African context, which does not mean 'primordially' (those who were here first) but those who have persistent marginalization and disadvantage to perpetuate their livelihoods, distinct cultures and languages within the mainstream of society, and whose livelihoods, identity and cultural survival depend on access to ancestral lands, territories and natural resources.
UN Declaration on Rights of Indigenous Peoples, 2007	The UN Declaration affirms the minimum standards for the survival, dignity, security and well-being of Indigenous Peoples. It delineates the individual and collective rights of Indigenous Peoples, including rights to cultural and ceremonial expression, identity, language, employment, health, education and other issues. It "emphasizes the rights of Indigenous peoples to maintain and strengthen their own institutions, cultures and traditions, and to pursue their development in keeping with their own needs and aspirations". It "prohibits discrimination against indigenous peoples", and it "promotes their full and effective participation in all matters that concern them and their right to remain distinct and to pursue their own visions of economic and social development".
Refugee (Recognition and Control) Act of 1968	An Act to make provision for the recognition and control of certain political refugees; to prevent in certain circumstances their removal from Botswana under the Immigration Act and to make provision incidental thereto or connected therewith. The Act states that; (1) A recognized refugee who is not detained under section 9 (2) or other lawful authority may leave Botswana at any time. (2) A recognized refugee shall on his departure from Botswana cease to be a recognized refugee.
African Union Agenda 2063	This is Africa's strategic framework that aims to deliver on its goal for inclusive and sustainable development and is a concrete manifestation of the pan-African drive for unity, self-determination, freedom, progress and collective prosperity pursued under Pan-Africanism and African Renaissance. The goal is to prioritize inclusive social and economic development, continental and regional integration, democratic governance and peace and security amongst other issues aimed at repositioning Africa to becoming a dominant player in the global arena.
Sustainable Development Goals (SDGs)	The Sustainable Development Goals (SDGs) (or the Global Goals), are a universal call to action to end poverty, protect the planet and ensure that all people enjoy peace and prosperity. These 17 Goals build on the successes of the Millennium Development Goals (MDGs) and include new areas such as climate change, economic inequality, innovation, sustainable consumption, peace and justice, among other priorities. The goals are interconnected – often the key to success on one will involve tackling issues more commonly associated with another.

Table 6: Gap Analysis for World Bank Safeguards Policies and Botswana Environmental Act and Regulations

EA Process Stage	WB (Operational Principles)	Botswana Environmental Assessment Requirements	Sub-Project Proposed Gap Filling Measures
Objectives	Environmental Assessment, OP 4.01	EA (Amendment) Act, 2020 and Environmental Assessment Regulations, 2021	There are no gaps identified and both WB Safeguard Policies and Botswana regulations will be applied.
Objectives	Physical Cultural Resources- OP 4.11	Monuments and Relics Act (2001)	No gaps identified. It is undertaken under Archaeological Impact Assessment.
Objectives	Involuntary Resettlement OP 4.12	<ul style="list-style-type: none"> • Acquisition of Property Act (1971) • The Land Control Act (1975) 	No gaps identified. OP 4.12 will be used with local legislations and the Resettlement Action Framework
Screening	The WB will classify all projects into one of four classifications: high risk, substantial risk, moderate risk or low risk.	This is the initial stage of the EIA process where the developer submits a project brief to the DEA for screening to determine whether a detailed EIA is required before implementation of the proposed development.	Both the World Bank policies and national laws will be applied.
ESIA Instrument	Depending on the project risks and impact, a range of instruments and procedures required to meet the ESSs' objectives, these include: Environmental and Social Impact Assessment (ESIA), ESMF, ESMP; environmental and social audit, cumulative impact assessment; and social and conflict analysis. The WB provides general guidance for implementation of each instrument. Based on information provided by the Borrower, the WB will conduct E&S due diligence for all projects requesting for WB support. The Borrower will be required to prepare, submit, and disclose the Environmental and Social Commitment Plan (ESCP), and Stakeholder Engagement Plan (SEP) before appraisal.	The DEA recommendation after receiving the project brief is determined by the Act, and the regulations. The DEA may recommend Strategic Environmental Assessment (SEA), a detailed EIA, an EMP, Waste Management Plan (WMP), or the project may proceed with conditions.	Both processes will be fulfilled.
Independent Expert	For high risk and complex project, the Borrower may be required to retain independent ESIA experts not	An environmental assessment practitioner registered and certified by the Environmental Assessment Practitioners	WUC duly appointed a certified EAPB consultant to undertake the ESIA study

EA Process Stage	WB (Operational Principles)	Botswana Environmental Assessment Requirements	Sub-Project Proposed Gap Filling Measures
	affiliated with the project to carry out ESIA.	Board (EAPB) shall be engaged to undertake all the environmental assessment statements mentioned above.	and compile an independent ESIA report and ESMP. The Sub-project is not of a high risk and complex nature and therefore the normal review processes will be instituted
Public consultation, stakeholder engagement, and GM	During the ESIA process, the Borrower consults project affected groups and interested parties about the project's environmental aspects and takes their views into account.	Public Participation is a structured meeting, called in accordance with Section 7, during which the public who are likely to be affected by the proposed activity are given the opportunity to express their opinions and concerns about the proposed activity. The public must be informed about the nature of the project, its benefits, and dis-benefits so they can be empowered to make informed comment.	Conduct ESIA consultation as per the EA Act and Regulations, taking cognizance of World Bank requirements, such as compliance to the COVID-19 protocols, during presentation of ESMP and VCP during consultation. The results from consultation will be incorporated into the ESIA/ESMP and VCP or can be submitted as an annex.
Disclosure	<p>The Borrower disclose ES documents at project sites;</p> <p>The WB will disclose documentation relating to the E&S risks and impacts of high risks and substantial risks projects prior to project appraisal.</p> <p>The WB discloses environmental and social (E&S) documentation based on the Borrower's authorization. Once the World Bank officially receives the report, it will make the ESIA Report in English available to the public through the Bank external website.</p>	Public Notice: A public hearing is a special meeting which allows the public to make submissions on an EIS before DEA make a final decision on its approval, rejection or deferment.	<p>Follow DEA Act, regulations and requirements and WB requirements.</p> <p>All ESIA/ESMPs, be publicly disclosed both in English and local languages.</p>
Clearance procedure	Review and clearance of E&S documents will follow upfront agreements between the Borrower and the WB. If the Bank is not satisfied that adequate capacity exists on the part of the Borrower, all High Risk and, as appropriate, Substantial Risk subprojects will be subject to prior review and approval by the Bank until	Review and authorization of environmental statement is done by the DEA, after they consider it to have adequately identified and assessed anticipated impacts associated with the proposed activity.	<p>The sub-project will be approved by the DEA if it meets the prescribed criteria.</p> <p>World Bank's review and clearance of the ESIA/ESMP will be required before implementation of the sub-project</p>

EA Process Stage	WB (Operational Principles)	Botswana Environmental Assessment Requirements	Sub-Project Proposed Gap Filling Measures
	it is established that there is adequate capacity.		
ESMP Supervision	During project implementation, ensuring compliance is the responsibilities of the Borrowers. Borrowers shall carry out E&S requirements and monitoring E&S compliance in accordance with project legal agreement (including the ESCP) and providing regular monitoring report to the Bank.	During project implementation, ensuring compliance is the responsibilities of the Developer.	Follow the approved ESMP/ESIA of the Sub-Projects and monitor accordingly

8. Environmental Baseline of Sowa Water Supply Scheme

CLIMATE

Climate. The climate of the project area is classified as semi-arid, of the low altitude, hot steppe type with summer rainfall. A characteristic of the climate is the unpredictability of rainfall and the extreme temperature variations that can occur between day and night in winter.

Temperatures are highest during summer, from September through to March. Average monthly maximum temperature ranges from 23°C to 36°C and 2°C to 25°C in summer and winter respectively. On average the hottest months are October and November. The coldest months are June and July; during winter months (May to August), night-time minimum temperature regularly drop to near freezing or below due to low humidity. The rainfall season runs from October to March with April as a transition month from summer to winter. The mean annual rainfall is 524 mm. (Climate Information Report 2010, Meteorological Services).

Evaporation: The annual average evaporation rate for the sub-project area recorded from the years 2003-2014 is 215mm. Evaporation rates decreases from February to June, and increase from July to October. The highest evaporation recorded was in October; 305mm, and the lowest was recorded in June; 140mm.

Wind: The winds in the sub project area are predominantly north-easterly. The maximum wind speed ranges between 11 and 21 knots. The north easterly winds of speed range 11-17 knots followed by 7-11 knots are predominant in the area (moderate to fresh breeze).

Air Quality: An assessment of the economic and industrial activities in the study area suggests that dust (particulate matter - PM), are the most likely environment aspect to impact the air-quality of the area. Other aspects such as Nitrogen Oxides (NO_x) and Sulphur Dioxide (SO₂) are highly unlikely to have impact due to the absence of significant sources of this aspect.

An Aeroqual Series 500 Monitor (S-500), and AEROCET-531S were used to measure suspended solids in the air (ambient PM).The exercise was carried out from 27 June to 1 July 2019 during the Makgadikgadi Epic event.

The average Particulate Matter (PM₁₀) was 52.2µg/m³, air quality levels are within allowable BOS 498:2012. Limit values for common air pollutants which cite a value of 200/µgm³.

The construction activities of the project are unlikely to significantly increase the motor vehicle traffic in the project area, and as such PM and NO_x levels will not be significantly altered from baseline conditions.

TOPOGRAPHY

The sub-project area is generally flat and dips gently towards the west (regional ground surface gradient is 1.7 m/km) to the Makgadikgadi depression at which the aquifer system of the project area discharges. The ground elevation has a maximum variation of up to 100 m amsl with the highest elevation of about 1000 m amsl to the east and minimum elevation of approximately 900 m amsl at the edge of Sua Pan. Surface drainage is dendritic and is dominated by the Moseitse River to the south, Tutume River, Semowane River and Nata Rivers to the north. The streams run south-east to north-

west and ultimately draining to the Makgadikgadi Pans as these form a regional surface water sink. Low gradients control the deposition patterns resulting in wide braided plains and inland deltas where the rivers enter Sua Pan. The 940 m amsl ground surface contour line represents the eastern-most limit of the palaeo-Makgadikgadi Lake.

GEOLOGY

The sub-project area is located in the centrally located Kalahari Karoo Basin of Botswana and covers more than half the country and comprises a major Carboniferous to Jurassic siliciclastic sequence with widespread continental flood basalt belonging to the Karoo Supergroup. The project area (Dukwi / Sowa) belongs to the north-eastern Karoo sub-basin portion of the Karoo basin in Botswana. A review of the literature by Green (DGS, 1966), shows that the Karoo rocks in the study continue eastwards into Zimbabwe and Northwards into Zambia and the Caprivi Strip. The faulted edge of the stormberg cover overstepping the Ghanzi Chobe fold belt marks the western boundary of the Karoo supergroup of North-eastern Botswana, while to the south; the boundary is marked by a Precambrian basement outcropping as ridges south of Dukwi, coinciding with major post Karoo dyke swarms through Makgadikgadi pans. The ridges have significantly influenced sedimentation in the project area and they are recognised as the lower Karoo starter hence the Dwyka and Ecca Groups have been encountered only at the southern margins of the study area (Smith, 1984).

HYDROLOGY

The main hydrological features in the project area are the pans or playas (dry, vegetation-free, flat area at the lowest part of an undrained desert basin). It is a location where ephemeral lakes form during wet periods, and is underlain by stratified clay, silt, and sand, and commonly, soluble salts. Examples within the sub-project area are the Makgadikgadi Pan and the ephemeral Moseitse river, which drains seasonally from southeast to northwest of the sub-project area into the Sua Pan (part of the greater Makgadikgadi Pans). The only major surface water bodies in sub-project are; the pans and ephemeral rivers with no flowing permanent rivers.

Makgakgadi Pan

Playas occur in arid regions where average annual rainfall does not exceed 500 mm. In general playas tend to have a negative water balance for most of the year due to marginal inputs combined with excessive losses in the form of evaporation and water infiltration. Large playas such as the Makgadikgadi, occupy continental basins which represent topographic low points in often flat and featureless landscapes. They may have been subjected to modification by recent Cenozoic tectonics and witness to higher lakes levels during a wetter past. The Makgadikgadi occupies the lowest point in the endoreic Okavango catchment and like most pans features no surface outflow. It may however host ephemeral surface water bodies following a short rainy season.

Pans may receive water in the form of direct rain contributions and considering the overall size of the Makgadikgadi (approximately 7000 km²), this may not be insignificant. They may also receive contributions in the form of surface and subsurface flow which in total may temporarily sustain lacustrine conditions. The overall hydrological regime of a pan is thus determined by external drainage controls such as catchment configuration and climate and internal controls such as the surface and groundwater relationship.

HYDROGEOLOGY

The sub-project area comprises essentially of a wide range of hydro stratigraphic units dominated by an extensive sedimentary sequence of the Karoo Supergroup. The hydraulic heads before abstraction were recorded and range between 28 and 40 mbgl (DWA, 1995). The formations comprising the hydro stratigraphic units of the study area encompass:

Ntane Sandstone

The Karoo rocks forms part of the largest sedimentary sequence in the north-eastern Botswana as previously envisaged. The Ntane sandstone is well spread in the Karoo sequence of Botswana, though generally fine grained, this formation has proved aquiferous on record in other areas. However, the Ntane sandstone in the Dukwi area do not show resourceful groundwater yields. Where substantial yields were intercepted, TDS values are too high for potable use.

Mea Arkoses

Lithostratigraphic logs of wells drilled in the sub-project area exhibit that this formation is extremely complex and variable locally, both horizontally and vertically. The formation is characterised on a macro-scale by a more argillaceous basal member overlain uncomformably by a more arenaceous middle horizon underlying a top member comprising of argillaceous and arenaceous strata. Lithological variability of a formation increases chances of high porosity, permeability and hence good storativity and transmissivity. The variability of this sequence on a more local scale is of hydrogeological vitality since the variation may be at a well domain and hence will certainly be within the range of influence of any multiple well developments. Due to the extensive variability of this formation, no particular horizon or position within the sequence is considered more yielding since water is intercepted randomly during drilling at variable levels. However, bulk accumulated data reflects that the grits and arkoses of the lower middle Ecca (Mea Arkoses) formation generally constitute the widest spread and better aquifer horizons within the sequence. These conclusions are further supported by GS10 project (1981) following their intensive investigation on Karoo hydrogeology in Botswana.

Climate Change Impacts on Water Resources

Effects of Climate Change on the Sub-Project

The most severe impact of climate change in a semi-arid country like Botswana is in a form of droughts. Droughts can be caused by several factors, some natural, some related to human-caused climate change, others driven by a range of human activities. The latest science says that as the climate warms, more precipitation is falling as rain as the case with Botswana, evaporation and transpiration increase too. All of these, combined with rising temperatures, can reduce water availability and increase water demands.

According to Statistics Botswana, droughts have affected many regions of the country during the period between 1981 – 2014. Specifically, the whole country was drought stricken during these periods: 1981-1987; 1991-1999; 2001-2005; 2007-2008; 2011-2013; and 2014. The worst drought in recent years was from 1981 to 1987 followed by 1990 to 1995. The results also indicate that Ghanzi, Kgalagadi, Southern, and South East Districts had the highest drought severity compared to other Districts (Botswana Environment Statistics: Natural Disasters Digest 2015).

Climate change will have serious impacts on the livelihoods of communities within the sub-project area and the natural environment they depend on. Some of the consequences will have impact over the longer-term, like spread of disease, while some have immediate obvious impacts, such as intense rain and flooding.

Soils. The soils in the project area have been mapped as predominantly arenosols (i.e. sandy soils). Parent material of the soils is extremely fine sand and silt derived from the fossil deltaic system. Development of the soil horizon is thin as the area is dry. The soils are fragile and vulnerable to erosion. The arenosols have been variously subdivided (only features of relevance to this sub-project are considered and detailed below):

- In some areas the soils are calcretised. The evaporation of calcium-bearing water results in the precipitation of calcite within the sandy groundmass. Where it is poorly developed, the result is powdery calcrete which is very susceptible to erosion. Where it is well-developed it lithifies the sand, resulting in hard, rubbly material which is much more resistant to erosion.
- In other areas, there is an accumulation of salts in the surface soils, which have a profound effect on the soil texture. They occupy exchange sites and prevent the soil particles from forming aggregates, which are less vulnerable to erosion than are the salt saturated individual particles. The result is increased susceptibility to erosion.
- Where the soils have a proportion of silt and clay, there is a tendency for the surface layer to compact, forming a sealing skin. This protects the soil from erosion but is easily broken down by trampling.
- Arenosols provide a very poor medium for rooting. Recovery of the protective plant cover is difficult when it has been destroyed and the bare soils become very vulnerable to erosion.

Biodiversity. The proposed water supply scheme runs through a Mopane Woodland, *Odysea* (Makgadikgadi) Grassplains and the Salt Pans. Mopane Woodland is dominated by *Colophospermum mopane*. However, the relative abundance, physiognomic and structure of this vegetation class varies with natural environmental gradients and human activity and the mopane tends to grow taller where there is more water and lower levels of anthropogenic activity. The Grassland Plains are typically open habitats dominated by monocotyledonous species. Within this vegetation type, the salt tolerant *Odysea paucinervis* is dominant, particularly around the Makgadikgadi Pans.

Fauna. Wildlife diversity generally increases in the northerly direction. The area immediately north of Nata is associated with a sudden increase in faunal diversity as a result of very low anthropogenic activity and that the area is closer to conservation areas in both Botswana and Zimbabwe. It should be noted that the project area falls within the high elephant (*Loxodonta africana*) density area of the sub-region with population estimated in excess of 200 000. The area carries the highest density of large herbivore species including the rare sable (*Hippotragus niger*) and roan antelope (*H. equinus*). A full suite of large African carnivores is extant in the area, i.e. tau African lion (*Panthera leo*), nkwe leopard (*Panthera pardus*), phiri-phamola spotted hyaena (*Crocuta crocuta*), lengau cheetah (*Acinonyx jubatus*), lehiritshwana brown hyaena (*Parahyaena brunnea*), phokoje black-backed jackal (*Canis mesomelas*) and side-striped jackal (*Canis adustus*), and thwane caracal (*Felis caracal*). Prominent avian species include the ostrich (*Struthio camelus*), kgori bastard (*Ardeotis kori*), secretary bird (*Sagittarius serpentarius*), gallinaceous birds, water fowls and wide array of raptors (e.g. manong (vultures)).

9. Social Baseline of Sowa Water Supply Scheme

Population Characteristics: According to the 2011 Botswana Population and Housing Census of Towns and Villages, the total population of project villages was 19,448. The males were 9,551 while females were 9,897 a difference of 346. Many of the project villages had more females than males except Moseitse and Maposa. Nata has the highest population at 6,714 followed by Sowa with 3,454 while Maposa has the least number of people at 413. The 2011 population was projected by a national figure of 1.9% which brought the total number of people in the project are estimated to be 24,395 for the year 2020.

Gender: According to the 2011 Population and Housing Census, the population of Tutume Central comprised 19,448 individuals; of which 9,551 were male and 9,897 females. The population was dominated by the 0 to 14-year age group (children) which represented 39% of the total population while 18-35 year age group (youth) represented 29% of the total population (see Table 44 for more information). The male-female composition of the population shows that there is a dominance of females in the project villages. This implies that there are more female headed households in the district.

Ethnicity: The sub-project area villages are predominantly Bakalaka and Basarwa. There are, however, some other ethnic groups in the sub-project area such as Bangwato, Bahurutshe, Barolong, and Batalaote. There are Basarwa in Moseitse, Kutamogoree and Manxotae who meet the criteria of Vulnerable Communities (Indigenous People) as per World Bank's OP 4.10.

Housing Infrastructure: The dwelling huts are made up of mostly natural materials, poles, grass, and mud. Individuals who can afford to live in small houses constructed from modern building materials, cement bricks, timber and corrugated iron sheets are few. Most of the yards are not fenced and where there is fencing it is just poles cut from trees and some lines of wire, not the commonly used diamond mesh and metal poles.

Social Inclusion of Women, Youth and Marginalized and Disadvantaged Groups

a) Gender and Gender-Based Violence (GBV)

Gender-Based Violence (GBV) is an emerging social issue in Botswana. GBV is deeply rooted in gender inequality, and while both women and men experience gender-based violence, most victims are women and girls.

A study by the Women Affairs Department and NGO Gender Links Botswana states that over two thirds of women in Botswana (67%) have experienced some form of gender violence in their lifetime, including partner and non-partner violence. A smaller, but still high, proportion of men (44%) admit to perpetrating violence against women.¹ The same study also noted that nearly one third of women (29%) experienced violence perpetrated by an intimate partner in the 12 months prior to the prevalence survey. In contrast, only 1.2% of women reported cases of GBV to the police in the same

¹ Government of Botswana (Ministry of Labour and Home Affairs and Women Affairs Department) and Gender Links (2012). "Gender Based Indicator Study <http://www.gov.bw/globalassets/mlha/gender-affairs/final-gbv-indicators-study-pamphlet--botswana.pdf>. See also, Management Sciences for Health (MSH) Botswana (2014) "Gender Based Violence in Botswana". <https://www.hivsharespace.net/sites/default/files/resources/MSH%20Fact%20Sheet%20Botswana%20GBV%20Oct%202014%20web.pdf>

period. Thus, the prevalence of GBV, SEA, SH and VAC reported in the survey is 24 times higher than that reported to the police. This suggests that levels of GBV are far higher than those recorded in official statistics.

The duty to fetch water is mostly done by women in the project area and they use 20 litres buckets to carry on their heads except for those who own wheel-burrows and donkey carts. The latter ones use 25 litres sealed containers and carry two or more containers at a time and push the wheel-burrow, but if it is a donkey cart, they have to direct the donkeys that are pulling the cart in the right direction. Men also do assist in fetching water when they are available at home and they mostly use wheelbarrows and donkey carts.

Scarcity of water means that women spend more time fetching water instead of concentrating on their home chores of cleaning, washing clothes, cooking, caring for the sick and people with disabilities. The issue of time management was raised during consultations by women, that they spend more time fetching water to store than on their homely chores.

A GBV, SEA, SH and VAC Action Plan that includes mitigation measures, a process in the project's GM for survivor centred GBV reporting, and a GBV referral pathway for services for survivors of GBV has been developed and a GBV, SEA, SH and VAC Specialist will be reporting for duty in May 2022 and her role will be to monitor the implementation of the GBV, SEA, SH, and VAC Action Plan in the portfolio sub-projects.

b) *Other Vulnerable and Disadvantaged Groups*

The sub-project area hosts the Dukwi Refugee Camp which is providing asylum for about 771 refugees and therefore considered as Other Vulnerable and Disadvantaged Group. The camp has 18 nationalities from as far as Morocco, Somalia, Democratic Republic of Congo (DRC), Burundi, Algeria, Kenya, Rwanda, Namibia, Zimbabwe, and Sierra Leone. The oldest refugee in the camp is from Morocco, who arrived in 1978. The highest number of refugees are from DRC followed by Somalia then Burundi.

A UNHCR report of 2015 distinctly raises concerns of GBV, prostitution and children abuse within refugee camp, the incoming GBV, SEA, SH, and VAC Specialist will be briefed to ensure that the GBV, SEA, SH, and VAC Action Plan and CoC are clear concerning the camp and ensure that she prioritizes the Dukwi Refugee Camp in capacity building of its workers on GBV, SEA, SH, and VAC issues. Other social issues such as HIV/AIDS, COVID-19, alcohol, and substance abuse will also be prioritized in capacity building for this community.

c) *Violence Against Children (VAC)*

Violence Against Children (VAC) is defined as physical, sexual, emotional and/or psychological harm, neglect or negligent treatment of minor children (i.e. under the age of 18), including exposure to such harm,² that results in actual or potential harm to the child's health, survival, development or dignity in the context of a relationship of responsibility, trust or power. This includes using children for profit, labour³, sexual gratification, or some other personal or financial advantage. This also includes other

² Exposure to GBV is also considered VAC.

³ The employment of children must comply with all relevant local legislation, including labour laws in relation to child labour and World Bank's safeguard policies on child labour and minimum age. They must also be able to meet the project's Occupational Health and Safety competency standards.

activities such as using computers, mobile phones, video and digital cameras or any other medium to exploit or harass children or to access child pornography.

The following risks exacerbates the possibility of VAC and harm to children, generally:

- Employing children below the age of 14 years by the Contractor and allowing children to sell to the workers during school hours. Botswana's Employment Act defines the minimum age of employment as 14 years, *when the child is not attending school*. The Act states that he/she may be employed on *light work not harmful* to his/her health and social development. The child should work for a maximum of six hours a day and 30 hours a week. While adults work for eight hours a week and not more than 48 hours a week.
- Using children for personal or financial advantage by both contractors and employees.
- Harassing children, including sexual exploitation and physical or sexual violence.
- Putting children's health and safety in danger by not protecting trenches that are close to where they play in their homes and within the built-up area.

d) Youth in Beneficiary Villages (Including Youth of Vulnerable Communities)

According to Statistics Botswana, 2011 Population and Housing Census, the total youth population is estimated at 26% (that is the age cohort between the ages of 18 - 35 years). Most of the unemployed are the youth and particularly those just coming out of school. The challenges they face include limited job opportunities, inadequate employable skills, and limited access to productive assets particularly those in the vulnerable communities.

The high rate of unemployment causes frustration, dejection, desperation and dependency, and the situation has left the youth in a vicious cycle of poverty that daily erodes their confidence and hopes for a prosperous and meaningful future. Consequently, they tend to abuse alcohol and drugs and thus are increasingly being involved in crime and delinquency. The implementation of this project should facilitate employment to the youth, both men and women.

E d u c a t i o n

The beneficiary villages have a total of 10 primary schools; 2 are in Nata, and the other 2 are located in Sowa. There are 3 junior schools in the project area, 1 is in Dukwi, another one in Nata, and the third one in Sowa. There is 1 senior secondary school located in Nata.

E c o n o m y , L i v e l i h o o d s a n d P o v e r t y

Employment: The employment sectors in Botswana include Central Government (25.7%); Local Government (23.1%) which is mostly Ipelegeng (Labour-based Public Works Programme); Private (46.5%) and Parastatal (4.7%) and these include Agriculture, Mining and Quarrying, Manufacturing, Electricity and Water, Construction, Wholesale and Retail Trade, Transport and Communication, Finance, Real Estate, Education, Health, and Other Community.⁴

⁴ Statistics Botswana – Formal Sector Employment Survey – Stats Brief, December 2018

Manxotae has the highest unemployment rate followed by Kutamogoree and Nata. Sepako has the lowest unemployment rate. Overall unemployment for the project villages was estimated at 12.0%. According to Botswana Multi-Topic Survey Quarter 4 (2020) Labour Force Module, there are 7,117 males, and 13,468 females employed in the entire Central Tutume District, which the project villages fall under. This indicates that more females are employed compared to males.

Mining: Although mines form a small proportion of the project area, they significantly contribute to the area and Botswana's economic profile. Mines in the project area include Mowana copper mine near Dukwi, and the soda ash mine in Sowa. While the spatial footprint of the mines is limited, the mines have an impact on the area, through employment, house rentals, and corporate social responsibility.

Tourism: Tourism development in the Sowa region appears to be on the increase due to the availability of several tourism sites which have different tourism products or resources that appeal to tourists, such as Makgadikgadi Pans, Sua pan, baobabs, flamingos, landscape, Mowana Copper Mine and Soda Ash Mine.

Tourism in the project area is primarily undertaken through the private sector with small to medium sized safari camps and serviced lodges dominating the industry. Some land is allocated to communities for community based natural resource management (Xhauhwatubi Development Trust; Nata Sanctuary: Nata Conservation Trust; and Lekhubu: Gaing-O Community Trust).

Botswana Tourism Organisation in association with Skydive Botswana and Nata Bird Sanctuary collaborate every year to host the Makgadikgadi Epic. This event takes place in the premier and prominent Makgadikgadi Salt Pans, and precisely, in the Nata Bird Sanctuary. Makgadikgadi is synonymous with awesome birding experiences and open natural landscapes that will be a marvel from any view, be it from the ground or above. Makgadikgadi has beautiful and breathe taking views, thus making it the best choice for skydiving. The main objective of the event is to give tourists/travelers a lifetime unique experience.

Social Protection - Labour-Based Public Works Drought Relief Program (Ipelegeng)

According to Policy Position Paper on Social Security and Social Protection in Botswana (2007), Ipelegeng (Labour-based Public Works Programme) then known as *Namola Leuba* was started in the 1960s as a poverty eradication strategy coordinated from the Office of the President. Its main objective is provision of temporary employment to community members throughout Botswana through momentary supplement to their incomes through wages. Unemployed community members register with the program and are offered temporary manual work on a rotational basis to work for six hours and earn P547 (US \$54.70) per month. The rotation is on a three-month basis and thereafter beneficiaries receive nothing for the subsequent months as they are laid off to make way for others due to the rotational system of employment under this programme. A lot of community members throughout the villages reported this programme as main source of income.

Livelihoods

The predominant livelihood in the project villages is subsistence agriculture. The communities of Manxotae and Kutamogoree are heavily dependent on the government Social Safety Nets provided

<https://www.statsbots.org.bw/sites/default/files/publication/Formal%20Sector%20Employment%20%20Survey%20Stats%20December%202018.pdf>

for under the Remote Area Development Policy (2009), which are mainly designed for the poorest people in the remote areas and Basarwa residing in the established villages. Manxotae and Kutamogoree settlements have very limited livelihoods and employment opportunities, with this situation and the standard of living for the Basarwa, it is important to ensure that the impacts of sub-project implementation does not perpetuate their situation, impoverish them further and erodes their dignity, norms and values.

Agriculture

The project area is sparsely populated with people from different backgrounds and cultures. However, the livelihood challenges are similar. Households depend on a number of livelihood sources the major one being agriculture which is undertaken primarily for subsistence purposes.

Arable farming: Arable farming in the area is characterised by the growing of traditional crops such as sorghum, millet, maize meal, water melons, beans, and sweet reeds mainly for subsistence purposes. Arable farming in the project area is significantly assisted by government through the provision of farm implements, seeds and technical advice. The government has put in place poverty eradication as well as youth development programs from the agriculture sector aiming towards self-sufficiency. Such programs include, CEDA young farmer's fund, backyard gardening, and the Integrated Support Programme for Arable Agriculture Development (ISPAAD) to address challenges facing arable farmers.

Pastoral farming: Pastoral farming in the project area is dominated by traditional production systems characterized by continuous grazing of livestock in communally shared land. Cattle and goats are the main livestock species reared. Other livestock reared include sheep and donkeys. Livestock is an important component of rural livelihoods as it provides cash income, meat, milk, draught power, skin, source of wealth, and prestige. Large herds of livestock are usually kept at the cattle posts while small herds are kept in the village area. The main cattle breeds kept are the Tswana cow and the Brahman bull. Because both are local breeds and are resistant to diseases like foot and mouth. Some animals have been cross-bred to produce higher breeds of animals. The government supports the subsistence farmers by helping them to control pests and diseases by spraying the grazing areas.

Poverty

According to Statistics Botswana (2010), amongst the beneficiary villages, those with the highest poverty levels are Manxotae and Kutamogoree settlements. These are higher than the national poverty rate of 16.3%. The high poverty levels could be due to the high unemployment levels as nearly 90% of residents are employed in the temporary government work program, Ipelegeng (labour public works program) where those enrolled in the program are paid a monthly wage for a two-month duration of the work program.

Land Tenure and Land Use

Regional Land Tenure: Tutume Sub-District falls within the tribal land tenure type; hence by extension most of the proposed project area also falls within tribal land which is administered by the Land Board. However, Sowa Town by virtue of being a town falls within the State Land Tenure under the administration of the Department of Lands. The BotAsh mine and the Nata Sanctuary are part of the Makgadikgadi Pans National Park which is under state land.

Regional Land Use: The mainland in the project area and villages is tribal land which is composed of residential, commercial, arable, and mixed uses all administered by Ngwato Land Board through the Sub-Land Boards at Nata and Tutume. The other land system is state land which is administered by

the department of Lands. Sowa Town, BotAsh Mine, Nata Sanctuary and Makgadikgadi Pans National Parks are all state land.

The main project components which are the pipeline routes will require land from the road reserves which are part of state land and wayleaves will be applied for through the Department of Roads. The storage tanks and pump stations will all require application through the Ngwato Land Board through the Sub-Land Boards in Nata and Tutume.

H e a l t h

In Botswana, healthcare is delivered through a decentralized system with primary health care being the pillar of the delivery system. Botswana has an extensive network of health facilities (Referral hospitals, District hospitals, Primary hospitals, clinics, health posts, mobile stops) spread over the twenty-seven (27) health districts. Central Tutume District has the lowest proportion of its inhabitants (16%) residing between an 8 and 15 km radius of the health facility, and 84% within 5 km radius from health facility. (Health Statistics Report 2010). According to Tutume District Health Management Team, the project villages have 9 clinics; 2 are located in Dukwi. The project villages do not have a hospital which means they go to Tutume Primary Hospital for services that are not offered in the clinics. Complicated cases are then transferred to Nnyangabwe Referral Hospital in Francistown.

COVID-19

As of 18 February 2022, there were 263,950 confirmed cases of COVID-19, 193 new positive tests, 1897 active cases, 2,619 coronavirus-related deaths reported in the country since the pandemic began. Since the start of vaccinations in March, 1,157,321 persons have been fully vaccinated whereas 1,419,857 received the first dose, and 158,470 received boosters. 92.8% of the eligible population has received their first dose while 75.6% are fully vaccinated. The sub-project is located in the greater Francistown Zone and the region has less than 10 people per 100,000 persons COVID-19 cases and the region and the country at large has seen even reducing infection rates.

HIV/AIDS

Botswana has one of the highest HIV prevalence rates in the world with latest reports from 2013 BAIS IV estimating it to be 18.5% of the general population aged 18 years and above (Statistics Botswana, 2013) compared to 17.6% in the 2008 BAIS III. The adjusted incidence rate for the 2013 BAIS IV was 1.35% compared to 1.45% in 2008 BAIS III. This current HIV prevalence for Botswana translates to 378,464 HIV positive persons out of an estimated population of 2,045,752 (Statistics Botswana, 2013). The HIV prevalence rate shows gender disparity with more females (20.8%) compared to males (15.6%) being HIV positive. HIV prevalence also varies by location. About 19.2% of urban population (Cities, Towns and Urban villages) compared to 17.4% of the population in rural areas are HIV positive (Statistics Botswana, 2013). Central Tutume District had an HIV prevalence of 18.9% in 2004, 20.0% in 2008, and 16.5% in 2013. The year 2013 had the lowest HIV prevalence rate whereas 2008 had the highest prevalence rate.

A d m i n i s t r a t i v e L o c a t i o n

District and Town Administration: The District Administration oversees the Central Government Administration in the district. The office is tasked with coordinating Central Government initiatives. It is headed by the Senior Assistant Council Secretary. The project area falls under Tutume Central which is located within the jurisdiction of the Tutume Sub District Administration, who report to the Central Administration headquarters in Serowe which is headed by a Council Secretary. However, Sowa Town

by virtue of being a town is administered by the Sowa Town Council which is different from the District Council and independent and it is headed by a Town Clerk.

District and Town Council: The Central District Council within which the project area falls is in charge of provision of social infrastructure and amenities within the district. The District Council, which is politically headed by the Council Chairman and administratively by the Council Secretary, prepares and implements the District Development Plans. The Sowa Town Council, which is politically headed by the Mayor and administratively by the Town Clerk, prepares and implements the Town Plans. The Sowa Town Council and Tutume Sub District Council are delegated to execute Council responsibilities within the town and the sub-district respectively.

Tribal Administration: Tribal Administration is tasked with the administration of justice under the customary law. The head of Tribal Administration in Central District is a *Kgosi* (Chief) (who is currently the acting paramount Kgosi, Kgosi of Bangwato Kgosi Serogola Seretse based in Serowe. He is the area's representative at Ntlo Ya Dikgosi (House of Chiefs) which comprises of various other *Dikgosi* (Chiefs) from across other districts in Botswana. Other secondary villages within the district are led by a *Kgosi*. Other villages are presided over by either Headmen of Records or Headmen of Arbitration. The Kgosi together with the headsmen exercises traditional authority after consultation with the tribe. The Kgosi arranges tribal ceremonies, assist in checking crime, promote the welfare of the tribe, convenes, and presides over *Kgotla* meetings.

Political Administration: The project villages fall under the Nata-Gweta constituency; the headquarters of the constituency is Sowa Town. Political leadership in Nata-Gweta is provided by a Member of Parliament (MP) assisted by various Councilors presiding over various village wards and representing them at the District Council. The Member of Parliament for Nata-Gweta is Honourable Paulson Majaga. MPs have responsibilities to three main groups: their constituents, Parliament, and their political party. MPs' duties in Parliament include participating in debates and voting on legislation and other matters. They may also be members of committees examining new laws or the work of government departments. MPs can help their constituents by advising on problems (particularly those that arise from the work of government departments), representing the concerns of their constituents in Parliament and acting as a figurehead for the local area.

Institutional Set Up: The institutional set up of planning in Botswana can be divided into three levels: Community Level, District Level and Central Government Level. The institutions at the community level, which are involved in the development process can be divided into two main categories: The Traditional Institutions – so called because of their pre-colonial origin – are the Bogosi (Chieftaincy), the kgotla and the wards. The kgotla represents the “institution” where common consensus can be arrived at and where development initiatives and participation can be encouraged. It is a traditional authority, Kgosi, (Kgosana), village headmen and ward heads are critical links between communities and government authorities. All villages have a Kgotla and the village Kgotla is led by the Kgosi who is responsible for calling the Kgotla meetings, trying cases under customary law, and is involved in village development.

The following **Tables 7 and 8** show summaries of social baseline for the project villages and Dukwi Refugee Camp respectively.

Table 7: Summary of Social Baseline for the Project Villages

Project village	Dukwi	Kutamogoree	Nata	Manxotae	Maposa	Mosetse	Sepako	Sowa
Population (Males & Females)	6,507	1,065	7,732	725	489	2,276	736	3,598
• Youth (18-35 years)	1893	197	2241	216	145	776	169	1590
• Children (under 14 years)	2508	519	2623	362	240	806	340	387
• Elderly (over 65 years)	196	132	303	25	16	161	43	9
Predominant Livelihoods	Subsistence Agriculture, Ipelegeng, and Poverty Eradication programmes							Mining
Poverty Rate	0.247	0.28	0.288	0.421	0.326	0.129	0.4	0.033
Unemployment Rate	11.4	20.0	12.1	31.7	12.4	7.3	3.7	12.7
Vulnerable Communities (Basarwa) under OP4.10		Basarwa		Basarwa		Basarwa		
Other Vulnerable and Disadvantaged Groups	Refugees at Dukwi Refugee Camp							
Other Ethnic Groups (and languages spoken)	Bakalaka, Barolong, Batalaote, Bakhurutshe, Bangwato. There may be some Basarwa working menial jobs in the different villages.							
Education Facilities								
No. of Primary Schools	1	1	2	1	1	1	1	2
Enrolment	907	415	2000	342	693	335	302	417
Pass rate	62	89	74	30	73	35	53	86
Community members on Anti-Retroviral Therapy	495	207	1,407	30	85	274	29	626

Health Facilities	2	1	1	1		1	1	1
-Total No. of Standpipes	3	6		5	7	1	10	
-Total No. Standpipes Working	3	4		1	4	0	4	
-Total No. Standpipes not Working	0	2		4	3	0	6	
Housing	Traditional and Standard Housing							Modern housing
Land Tenure	Tribal land							
Electricity	National electricity grid							
Religion/Spirituality	Christianity, Islam, Hindi, and Traditional beliefs							
Cultural/Customs	Traditional dance, rites of passage							
Social Issues	School Dropout, Teenage Pregnancy, GBV, SEA, SH, and VAC							
Governance	Tribal and Political Administrations							

Table 8: Summary of Social Baseline for Dukwi Refugee Camp

Population			
Age Cohort	Female	Male	Grand Total
Children (0-14 years)	135	135	270
Children (15-17years)	22	23	45
Youth (18-35years)	107	133	240
Adults (36-65 years)	-	4	4
Grand Total	312	459	771
Predominant Livelihoods:	Subsistence farming, backyard gardening, menial jobs, and small businesses		
Poverty Rate:	N/A		
Unemployment Rate:	N/A		
Ethnic Groups:	Somali, Hutu, Tutsi, Ndebele, Sona, Congolese, Rwandese, Burundian, Eritreans		
Languages:	English, Swahili, Lingala, Ndebele, Shona, Kirundu, Kinyarwandwa, Somali, Nyamulenge, French, Luba		
Educational Facilities	One (1) primary school		
Primary School Enrolment Rate	2021 Enrolment Numbers:194		
Pass Rate	2020 Pass Rate: 78.6%		
Health Facility:	One (1) Clinic with Maternity, Child Welfare Clinic (CWC), Maternal Child Health (MCH) and Sexual Reproductive Health (SRH), and Anti-retroviral therapy services.		
HIV Prevalence:	Twelve (12) patients on ARVs. That represents 1.6% of the total refugee population of 771.		
COVID 19 Situation	Sixty-nine (69) positive cases were recorded, and all have recovered		
Land Tenure	The Camp site sits on a tribal land, and it measures 1651.1450Hectares		

Water and Sanitation	Households connected = 75 Households using standpipes = 75 Total No. standpipes working/ not working = N/A Total Refugee Houses connected with standpipes = 152 - 135 working - 17 not working
Housing (Types of Housing)	Staff Houses = 75 staff houses Refugee Housing = N/A
Electricity	The Refugee Camp is connected to the national power grid.
Religion/ Spirituality	Christianity and Islam
Cultures/ Customs	Varied according to ethnicity
Social Issues	a) Teenage pregnancy: Six (6) pregnancy cases since May, 202 to date b) Gender Based Violence (GBV), Sexual Exploitation and Abuse (SEA), Sexual Harassment (SH), and Violence Against Children (VAC) – No records on GBV, SEA, SH, and VAC.
Governance	The Camp is managed by a Camp Manager from Ministry of Defense, Justice and Security. There is also other Heads of Departments in the Camp at Police Station, Clinic and Primary School and UNHCR who form a Camp Management Team. Refugees have their own structures, an umbrella Refugee Welfare Committee as well as community level Committees.
Aspirations of Community Members	To find durable solutions to their plight.

Source: Ministry of Defence, Justice and Security, Botswana, (2021)

Social Assessment of the Basarwa

a. History of San (Basarwa) in Botswana

The Basarwa (also known as San peoples) have lived in Southern Africa since prehistoric times. Archaeological evidence indicates that the San lived in small mobile groups with complex microlithic stone tool technology (Hitchcock *et al.*, 2006). At one time, the San occupied an area stretching from the Congo-Zambezi watershed in central Africa south to the Cape. The San were relatively widely dispersed in the region. Today, San peoples (estimated population 90,000) reside in six countries. Most of the San are found in the Kalahari Desert region of Botswana (estimated population in Botswana, 55,000 persons; Namibia, 27,000; South Africa, 10,000; Angola, <5000); Zimbabwe, (1,200; and Zambia, numbers unknown).

Botswana is a culturally diverse country. Its Constitution initially recognized eight major tribes. However, several other ethnic groups have recently obtained such official recognition, Basarwa included. Although most of these groups claim to be “original” to Botswana and many of them live in marginal conditions and are considered vulnerable (which the government understands the term to mean), there is little doubt that the San (Basarwa) have been historically excluded for their distinct cultural characteristics, and that affirmative measures are necessary to ensure their inclusion and cultural survival in the country. Numerous studies suggest that the San are among the oldest peoples of Africa, and in Botswana, are found to be the first place to have originated some 200,000 years ago.⁵

History of Basarwa in Kutamogoree, Moseitse and Manxotae

Basarwa have lived in the Nata area, which includes Kutamogoree, Manxotae and Moseitse, for centuries in peace and harmony with nature until their contact with European trophy hunters in the early 1860s, and later the Bangwato. The latter group became Basarwa’s self-declared landlords or masters. Initially, Basarwa never imagined Bangwato being their masters or landlords. They viewed them as sophisticated hunting partners. Gadibolae (1985:25) says that the ‘formal’ contacts between the two groups began in the 1860s, when Bangwato organised hunting expeditions into the Nata area, looking for the prized elephant tusks, ostrich feathers and kerosses. Many African communities had enthusiastically responded to the globalised ivory trade, spearheaded by the Griquas in Southern Africa. The Griquas had moved into what is today Botswana, from the Cape Colony, at the beginning of the 1800. They recklessly killed thousands of elephants, using guns, to harvest their tusks (ivory), which was in high demand in Asia and Europe (Tlou and Campbell, 1997: 173-176). Despite the reckless destruction of wildlife, the Griquas were later joined by some Tswana groups, especially the Barolong and Batlhaping, who became long-distance wagon traders.

Bangwato-Basarwa Relations in the Nata Area, 1860s Onwards: The Bangwato too dispatched hunting expeditions, which went as far as the Boteti and Nata areas, to kill elephants for their ivory. They had guns and political power to subdue many weaker groups, and the Basarwa of Nata and Boteti became casualties. It is, however, worth noting that at first the Basarwa were not coerced to join the Bangwato hunting expeditions. They willingly joined since they lived by hunting and gathering of wild fruits. The fact that guns made hunting easier obviously attracted Basarwa, who had relied primarily on rudimentary methods of hunting. Gadibolae (1985:25) argues that over time, Bangwato gave Basarwa hunting guns and dogs to hunt for them, especially to supply ostrich feathers, tusks and kerosses, which ‘fetched high prices overseas’. Basarwa participated in the hunting expeditions as a

⁵ Indigenous People’s Planning Framework – Human Wildlife-Conflict Management (HWCM) in Northern Botswana Project (2016). See also Chan, E.K.F., Timmermann, A., Baldi, B.F. *et al.* Human origins in a Southern African palaeo-wetland and first migrations. *Nature* **575**, 185–189 (2019) doi:10.1038/s41586-019-1714-1.

way of having easier access to game meat, and not necessarily the lucrative ivory trade, which they had no clue about. However, the relations between Basarwa and Bangwato in the Nata area changed from happiness to sorrow when the lucrative ivory trade declined, largely due to the near depletion of elephants in the area. When this happened, the western world and international ivory buyers turned around and blamed Africans for less regard for wildlife (Hinz, 2003). Bangwato, realising that the international ivory trade, which had provided them with capital, political and economic prestige, was declining returned to cattle farming, which they had, temporarily, 'neglected'. Thus, Khama III 'ordered his headmen to allow their cattle to be herded by the Basarwa, so that they (Basarwa) could have the benefit of the milk' (Gadibolae, 1985:25). This was the beginning of the unequal relationship between the two groups. Basarwa were forced to become serfs (malata) of the Bangwato, a dehumanising practice. This was, however, largely ignored by the colonial government. Bangwato expanded and intensified cattle farming, and, thus, 'conscripted' Basarwa men and boys to herd their cattle. The introduction of western education also meant that the Bangwato boys, whose main job had been traditionally herding of cattle, had to go to school. Their replacement was sought in the form of Basarwa boys and men (Gadibolae, 1985: 25). It was easier to subdue Basarwa because Bangwato were politically and economically powerful. Bangwato used headmen to control faraway places, and Basarwa were distributed to these headmen. Thus, 'In the Nata, all Basarwa belong to one of the Bangwato wards such as Ditharapa, Maaloso, Sekao and Basimane' (Gadibolae, 1985:25).

Basarwa in Moseitse: The area, Moseitse, was and is also known as 'Debeetshaa', a Sesarwa word meaning salty water. Debeetshaa is a tributary to the Moseitse river. Despite the contestations about the name and naming of Moseitse, there is no doubt, even among all the groups found there, that Basarwa are the first inhabitants of the area. Mengwe (2010:121) says that the prominent Basarwa group in the area was led by Xuxuwe Kolobe. This group was befriended by the Bangwato and Bakalanga, who came to the area for different reasons, and at different times. Inter-marriages between different groups in the area produced a heterogeneous community. The exploration of minerals by the Roan Selection Trust (RST), between 1962 and 1982, attracted migrants from other parts of Botswana, mainly the north-east. A Witwatersrand Native Labour Association (WENELA) camp was erected in what is today Moseitse, and it housed these migrant workers. Due to mining, a permanent settlement was established along the banks of Moseitse river, the village of Moseitse today. It was officially declared a village in 1971. Many groups of people, who had lived in scattered cattle-posts around the area, moved to Moseitse, thus 'producing a heterogeneous community dominated by Basarwa' (Mengwe, 2010:121). Even if so, the non Basarwa groups in the area look(ed) down upon them, and exploit them, especially by using them as cheap and sometimes free labour.

Basarwa in Matsitama: Matsitama is not explicitly mentioned as a study area, yet it is dominated by Basarwa. Originally, Matsitama was called *Dauginae*, a Sesarwa word meaning 'a road to the river'. Basarwa cattle herders used the road, passing through the area, to water cattle at the river. Matsitama was known for its valuable copper, which was verified by geologist Rolf Kreimeyer (Rannoba, 2019). It was also regarded as the cattle posts of Bangwato. By the 1930s, Basarwa lived as serfs in the Bangwato owned cattle posts in the Nata area (Gadibolae, 1985). Bangwato found in the Matsitama area today came during the reign of Khama III. Moseitse, Jamini, Matakane, Mokubilo, Lekobeng, and Lepashe were all used by Bangwato as cattle posts (Rannoba, 20219). In 1962, a copper mine, run by the RST, was opened in Matsitama, and a settlement started. Before then, there were cattle posts. The Cire Cire (a Basarwa group) used Matsitama as a refuge after the mine opened. They were running away from servitude and ill-treatment by their masters, Bangwato and Bakalanga. The RST opened a school, mainly for the workers of the mine. Over time, its officials allowed the Basarwa children to also attend. However, when the company closed shop in 1966, the issue of who will take over the school arose. The mine consulted the people. It told them that they should consider taking over or the mine would have to destroy the structures. Basarwa contacted Bangwato, the contested 'owners of the land', about their (Basarwa's) desire to take over the school. Bangwato granted them permission.

The Basarwa communities had no choice, but to ensure that Matsitama became a village. Thus, unlike the other groups, who had options to go back to their original villages, they (Basarwa) had left the cattle posts, running away from their oppressive masters. Matsitama became a haven and place of peace and tranquility, away from the de-humanising environment (Rannoba, 2019). In 1981, Matsitama was officially declared a village by the government. It was and still it is inhabited mainly by Basarwa, Bangwato and Bakalanga.

Social Assessment of Vulnerable Communities of the Sub-project as per OP4.10

The Basarwa communities in Kutamogoree, Manxotae and Moseitse were screened against the criteria of OP 4.10. They were found to meet the characteristics in varying degrees as a distinct social and cultural group, despite changes in their traditional livelihoods and cultural practices as a result of dislocation from their lands and cumulative impacts of various policies on them:

i. Self-Identification

They self-identify as members of a distinct indigenous cultural group and are recognized as such by others in national, regional, and international contexts. This is because they still identify themselves as Basarwa and have not forgotten their ancestral history.⁶

ii. Collective Attachment to Ancestral Lands or Geographically Distinct Habitats

The Basarwa in the sub-project area have formed a collective attachment to the land they currently occupy, even though historically the project area would not be considered their ancestral territories. Since the early 1900s, many Basarwa left their lands because they were transformed into large cattle farms and national parks such as the Central Kalahari Game Reserve (1961) and the Kalahari Gemsbok National Park (1931)⁷. Despite ancestral land loss, the Basarwa in these three settlements formed a collective attachment to land they currently occupy.

iii. Distinct Customary Cultural, Economic, Social, or Political Institutions

They still practice hunting at a small scale as they must apply for a permit to hunt for example guinea fowls and other game, and they still gather wild fruits and tubers for their consumption and selling any surplus left. They still practice their ancestral dance of 'tsutsube'. They still teach their children this dance and even take them to the western side of the country to learn their ancestral dances. In addition, they still practice 'botsetsi' to commemorate the transition of a girl to womanhood at first menstruation, as well as rites of passage for boys who are maturing into manhood. In addition, there are traditional healers in both settlements who provide healing through prayers to the gods and herbs or traditional medicine, and some practice their traditional religions in addition to Christianity.

⁶ According to some national organizations representing Basarwa in Botswana, they find the term Basarwa derogatory as it is an imposed term and would prefer the term "Bakhwe" be used. However, the two communities that were consulted for this project preferred the term Basarwa and will be referred to as such here. In addition, "San" is a generic term and the distinct linguistic groups among the San designate themselves by their own name, as for instance, Khwe, Nharo, #Khomani, etc. However, as noted above, some communities still prefer to use the term Basarwa. The project will use the term preferred by the community. See Albert Barume, *Land Rights of Indigenous Peoples of Africa*. (Copenhagen: IWGIA, 2014), p. 12.

⁷ IPPF for the World Bank funded project, Human-Wildlife Conflict Management in Northern Botswana (2016).

iv. Distinct Language or Dialect

The Basarwa speak their distinct dialect, Sesarwa, a click-based language that differs from other languages in the country, even though some of the young generation cannot speak the language.

The presence of the Basarwa in the sub-project area calls for the development of a Vulnerable Communities Plan (VCP). The preparation of the VCP takes into consideration the findings of the social assessment of the communities in the project areas. Basarwa people, who in most of the development policies and legislation of Botswana are referred to commonly as the Remote Area Dwellers, are the group of people who speak different click languages and they originally survived on hunting and gathering. The VCP will be prepared as an additional plan along with the ESMP for the Sowa Water Supply Scheme. Its purpose is to ensure the application of the World Bank's Indigenous People's Policy OP 4.10 in the planning and implementation of the Sowa Water Supply Scheme.

Land Tenure and Land Use

Regional Land Tenure: Tutume sub-district falls within the tribal land tenure type; hence by extension a majority of the proposed project area also falls within tribal land which is administered by the Land Board. However, Sowa Town by virtue of being a town falls within the state land tenure under the administration of the Department of Land. The BotAsh Mine and the Nata Sanctuary are part of the Makgadikgadi Pans National Park which is under state land.

Regional Land Use: The main land in the project area and villages is tribal land which is composed of residential, commercial, arable and mixed uses all administered by Ngwato Land Board through the Sub-Land Boards at Nata and Tutume. The other land system is state land which is administered by the department of Lands. Sowa Town, BotAsh Mine, Nata Sanctuary and Makgadikgadi Pans National Parks are all state land.

The main project components which are the pipeline routes will require land from the road reserves which are part of state land and wayleaves will be applied for through the Department of Roads. The storage tanks and pump stations will all require application through the Ngwato Land Board through the Sub-Land Boards in Nata and Tutume.

Waste Management

Solid Waste Management: Solid waste or refuse management is administered by Environmental Health Department of Tutume Sub-District Council and Sowa Town Council respectively. The Environmental Health Department usually engages private companies to collect solid waste in some villages on their behalf. Lately, collection of waste has been outsourced to the community through the use of donkey carts to transport waste to the disposal sites. Waste collected from government institutions and residential houses is disposed of at respective dumping sites. All the project villages have dumping sites. However, the dumping sites are not fenced, and as such there is illegal access by people and animals which pose a health concern. There is no segregation of waste or compaction that is practiced at these sites. The Department of Environmental Health indicates existence of the problem of indiscriminate waste disposal and the department has embarked on annual clean-up campaigns through cleanest school and village competitions.

Land Acquisition and Resettlement

Resettlement

There will be no acquisition of private property, public lands are free of encumbrances (i.e., no squatters and encroachers), and the pipes will go through the roads reserve. If some encroachments are realized, the necessary consultations will be done with the project affected persons and they will be duly compensated following the Resettlement Action Framework of 2017.

Scope of Land Acquisition

A separate Resettlement Action Plan (RAP) will be prepared for this sub-project as it has several anticipated land acquisition issues which entail land acquisition for all the pipeline servitudes, storage tanks and pump stations as outlined by **Table 9**. A 5m pipeline servitude will be required to connect the Dukwi Waterworks with various villages of the scheme to transfer the water from the Dukwi Wellfield. This will be undertaken through application for way-leaves through the Department of Roads.

The water storage tanks, and pump stations will both require land acquisition which will require direct application for land through the Ngwato Land Board via the relevant Sub-Land Boards. The proposed sites are within tribal land and therefore under the jurisdiction of Ngwato Land Board. The Nata reservoir tank will require additional land to accommodate the reservoir tank and hence an application for extension of the current plot will be made through the Nata Sub-Land Board.

Table 9: Land Required for the Sub-Project

Description	Location	Required Size	Total Size	Responsible Land Authority (Tenure)	Current Land Use
Proposed Storage Tanks and Pump Stations					
Nata Reservoir and Pump Station	Nata	Existing plot 1763 m ² , extra land 2189 m ² and total land required 3952 m ²	0.395 Ha	Ngwato Land Board (Tribal land)	Vacant tribal land while existing plot is used for the elevated tanks
Kutamogoree Elevated Tank	Kutamogoree	408 m ²	0.041 Ha	Ngwato Land Board (Tribal land)	Tribal land
Dukwi East Elevated Tank	Dukwi	900 m ²	0.09 Ha	Ngwato Land Board (Tribal land)	Tribal land
Dukwi Village Elevated Tank	Dukwi	616 m ²	0.062 Ha	Ngwato Land Board (Tribal land)	Tribal land
Nata Elevated Tank	Nata	900 m ²	0.09 Ha	Ngwato Land Board (Tribal land)	Tribal land
Manxotae Elevated Tank and Pump Station	Manxotae	900 m ²	0.09 Ha	Ngwato Land Board (Tribal land)	Tribal land
Dukwi Waterworks Pump Station	Dukwi Waterworks	Within the existing plot		Ngwato Land Board (Tribal land)	Land used for Dukwi Waterworks
Mosetse East Pump Station	Mosetse	967 m ²	0.0967 Ha	Ngwato Land Board (Tribal land)	Tribal land
Proposed Pipelines					
Dukwi Waterworks to Dukwi Village rising main	Between Dukwi Waterworks and Dukwi	12.2 km pipeline with a 5 m wide servitude	6.1Ha	Department of Roads (State land)	Reserved or planned land within the road reserve for laying of utilities such as water pipes, power, sewerage, telecommunication lines

Description	Location	Required Size	Total Size	Responsible Land Authority (Tenure)	Current Land Use
Take-Off from Dukwi Waterworks to Dukwi Village rising main to the Dukwi Refugee Camp elevated Tank	Between Dukwi Waterworks, Dukwi and Dukwi Refugee Camp	1.2 km Pipeline with a 5 m wide servitude	0.6 Ha	Department of Roads (State land)	Reserved or planned land within the road reserve for laying of utilities such as water pipes, power, sewerage, telecommunication lines
Dukwi Village to New Dukwi East Elevated Tank rising main	Dukwi	6.8 km pipeline with a 5 m wide servitude	3.4 Ha	Department of Roads (State land)	Reserved or planned land within the road reserve for laying of utilities such as water pipes, power, sewerage, telecommunication lines
New Dukwi East Elevated Tank to Moseitse West and Moseitse East gravity main	Between Dukwi and Moseitse	9.8 km pipeline with a 5 m wide servitude	4.9 Ha	Department of Roads (State land)	Reserved or planned land within the road reserve for laying of utilities such as water pipes, power, sewerage, telecommunication lines
Moseitse East to Kutamogoree rising main	Between Moseitse and Kutamogoree	28.2 km pipeline with a 5 m wide servitude	14.1 Ha	Department of Roads (State land)	Reserved or planned land within the road reserve for laying of utilities such as water pipes, power, sewerage, telecommunication lines
Dukwi Waterworks to Sowa System gravity main	Between Dukwi Waterworks and Sowa Town	22 km pipeline with a 5 m wide servitude	11 Ha	Department of Roads (State land)	Reserved or planned land within the road reserve for laying of utilities such as water pipes, power, sewerage, telecommunication lines
Dukwi Waterworks to Nata System gravity main	Between Dukwi Waterworks and Nata	48.4 km pipeline with a 5 m wide servitude	24.2 Ha	Department of Roads (State land)	Reserved or planned land within the road reserve for laying of utilities such as water pipes, power,

Description	Location	Required Size	Total Size	Responsible Land Authority (Tenure)	Current Land Use
					sewerage, telecommunication lines
Nata to Manxotae rising main	Between Nata and Manxotae	33.7 km pipeline with a 5 m wide servitude	16.85 Ha	Department of Roads (State land)	Reserved or planned land within the road reserve for laying of utilities such as water pipes, power, sewerage, telecommunication lines
Manxotae Elevated Tank to Sepako gravity main	Between Manxotae and Sepako	27.9 km pipeline with a 5 m wide servitude	13.95 Ha	Department of Roads (State land)	Reserved or planned land within the road reserve for laying of utilities such as water pipes, power, sewerage, telecommunication lines
Dukwi Labourer's Camp	Near Dukwi Waterworks	100 x 100 m	1 Ha	Ngwato Land Board	Tribal land
Dukwi Contractor's Camp	Near Dukwi Waterworks	100 x 100 m	1 Ha	Ngwato Land Board	Tribal land
Nata Contractor's Camp	Still to be specified but should be vacant land	100 x 100 m	1 Ha	Ngwato Land Board	Tribal land
TOTAL AREA OF LAND NEEDED			98.9647 Ha		

10. Archaeology

Introduction

The geomorphological history of Palaeo-lake Makgadikgadi, now the Makgadikgadi Pans, has been a focus of study by both geomorphologists and archaeologists since the 1940s. Wayland, who was the Director of the Geological Survey from 1943-1952, collected over 6000 stone tools as 'zone fossils' to date geological strata and geomorphological features. The data further provided climatic oscillations in the past, especially 'pluvials'. He did much to dispel the notion that the Kalahari was a marginal environment into which the Bushmen had been pushed by Bantu farmers. His collection, from 159 sites, was analyzed by Cran Cooke (1970) in his preliminary survey of the Stone Age of Botswana. This included an Acheulian site at Lake Xau, Middle Stone Age sites on the Nata and Boteti rivers, Lake Xau, Letlhakane and at Bushman Pits, and Late Stone Age near Gweta.

Ebert and Hitchcock followed up on this in the late 1970s by more specifically targeting strandlines of ancient Lake Makgadikgadi, especially on the east and south shores, using stone tool assemblages from 38 sites to attempt to establish a chronology of the Palaeo-lake and an initial understanding of the prehistoric climatic conditions required to maintain certain lake levels. Work, initially by Netterberg in the late 1960s and taken up by John Cooke, Shaw and Thomas in the 1980s obtained Carbon-14 dates from calcretes directly associated with ancient strand lines, which in turn clarified the archaeological sequence. This culminated in Thomas and Shaw's (1991) comprehensive book *The Kalahari Environment*, bringing together years of research by geomorphologists, palaeo-climatologists and archaeologists and presenting a fascinating history of environmental changes from vast inland lakes and major perennial rivers to the pans, dry fossil riverbeds and semi-desert of today.

Importance of Archaeological and Heritage Sites

Heritage resources are non-renewable and susceptible to alteration, damage, and destruction by construction and development activities. The value of heritage resources cannot be measured in terms of individual artifacts or biological specimens, rather the value of these resources lies in the integrated information which is derived from the relationship of the individual artifacts and fossil specimens, associated features, spatial relationships (distribution), and contextual situations.

Archaeological resources are important because they enhance economic development, especially tourism. They also act as 'spiritual homes' for various local communities and are a form of identity. It is imperative that environmental protection recognizes the need to protect cultural resources.

Conclusion and recommendations

There is potential to uncover sensitive areas/sites with cultural significance in the sub-project area. These must be avoided and/or protected. The Makgadikgadi Pans area is extremely interesting for its geomorphological history and associated climate changes. The archaeological sites chart the cultural evolution of mankind from early hominid hunters/scavengers to the first modern humans, hunters possibly following migrating herds, the first introduction of livestock and pottery into southern Africa, arrival of Bantu farming communities, specialized riverine adaptations by Khoe groups, to chiefdoms of pastoralists living around the Sowa Pan especially in defensive locations on the escarpment edge in strategically- walled settlements, to the elite sites of the earliest Zimbabwe state, and refugee communities during the turbulent 19th century, in part documented in the diaries of early European explorers.

Since sub-surface materials may be uncovered in the sub-project area during construction, Archaeological Watching Brief and Monitoring Program should be implemented during all stages of the project that involve the disturbance of the subsurface.

11. Assessment of Project Alternatives

Assessment of Project: The assessment of alternatives examines the feasible alternatives of a proposed project from different points of view: technical, financial, regulatory, jurisdictional, environmental and social. It promotes better decision-making by identifying the most viable and financially feasible alternative and minimizes adverse impacts and risks for communities and the environment – ultimately making a better, stronger and more sustainable project.

The Project Option Alternative: Implementation of the proposed sub-project would result in improved water supply in terms of both quality and quantity for the current and future needs of the project villages. The extraction of groundwater will increase water supply and hence add value to the livelihoods and economy of residents since adequate water supply can support government programmes and promote investment activities. However, developing mitigation measures to minimise and avoid the potential negative impacts would lessen the effects of the project on the environment and the general social well-being of the communities.

The ‘No Project’ Option: The ‘No Project’ Option” (zero option) alternative will be to maintain the existing *status quo*. Without the proposed sub-project (Sowa Water Supply Scheme), the communities would continue to experience inadequate and saline water supply. With raising water demand exacerbated by climate change events, the affected communities would continue to be exposed to increased environmental and social risks as well as associated health and safety issues. Therefore, it is evident that the ‘no project’ option would not be beneficial to the overall economic growth and welfare of the communities and environment.

Adopting the ‘no project’ alternative will eliminate potential negative social or environmental impacts associated with the implementation of the proposed project. The ‘no project’ alternative will however affect the mandate of WUC as a water supply authority of developing a reliable water supply scheme for potable water supply that will sustain the water requirements for the project villages in the short and long terms. WUC’s mandate is to ensure that all the residents of the country have access to potable water at all times in a most cost-effective manner. Currently, it is practically impossible to meet the ever-increasing water demand in the villages from the current operating scheme, owing to rapid population increase within the project villages, as well as water losses from pipe breakages and leakages thereof. The economic and social benefit of the proposed project is comparatively higher than maintaining the *status quo* and not realizing the project. Therefore, the ‘no project’ alternative is not a **viable option**.

The ‘No Project’ Alternative fails to achieve any of the project objectives, which are directed at improving water supply reliability, offsetting surface water demand, minimizing environmental impacts, achieving financial sustainability, and protecting human health; therefore, implementation of the water project is required.

Location Alternatives

Tank Sites: Location alternatives were not considered for most of the project village’s tank sites. Through public consensus, it was agreed on meetings held at the project villages (11th to 14th October 2021) to continue with the existing sites and avoid disturbing new sites. However, the engineering design will determine where to place the tank based on the maximum coverage or gravity.

Pipeline Routes: The majority of the proposed pipelines route that would connect Sowa Water Supply Scheme project villages are to be confined to the existing road servitudes to avoid disturbing new areas hence preserving the environment. This will significantly reduce the chances of unearthing archaeological material in the project areas, although the sub-project would still be subject to archaeological monitoring in case of chance discoveries/finds.

Demand for Workers' Accommodation

The proposed sub-project will require several teams to undertake various tasks (construction of pump stations, storage reservoirs, pipelines, and installation of elevated water tanks in several villages) therefore, the contractors' crew would need accommodation throughout the implementation of these activities.

An **on-site worker accommodation camp** alternative with a capacity of up to 50 persons was evaluated against **off-site accommodations** (renting accommodation within the sub-project area).

The worker accommodation camps are applicable to the proposed sub-project because some project works will be concentrated away from the villages (storage reservoirs and pipelines) while some will be within the project villages (pump stations, pipelines and elevated tanks). Due to the remoteness of the beneficiary communities, it is recommended to establish two (2) main worker accommodation camps at the following proposed sites:

Camp 1. Labourer's camp and contractor's camp outside Dukwi village, near the Dukwi Waterworks, that will cater for all the works from the boreholes, feeder pipelines, collector pipeline, proposed water storage reservoir to works within the Dukwi Village. Camp 1 should also cater for works halfway on the proposed pipeline, i.e. works from Kutamogoree, Moseitse, Dukwi and Sowa.

Camp 2. Another proposed contractor's camp to be established in Nata village that should cater for the pipeline from Sowa junction to Nata elevated tank and booster station, pipeline from Nata to Maposa to Manxotae and Sepako villages. There is availability of rented accommodation in Nata, therefore renting accommodation for workers will be a viable option based on advantages discussed above.

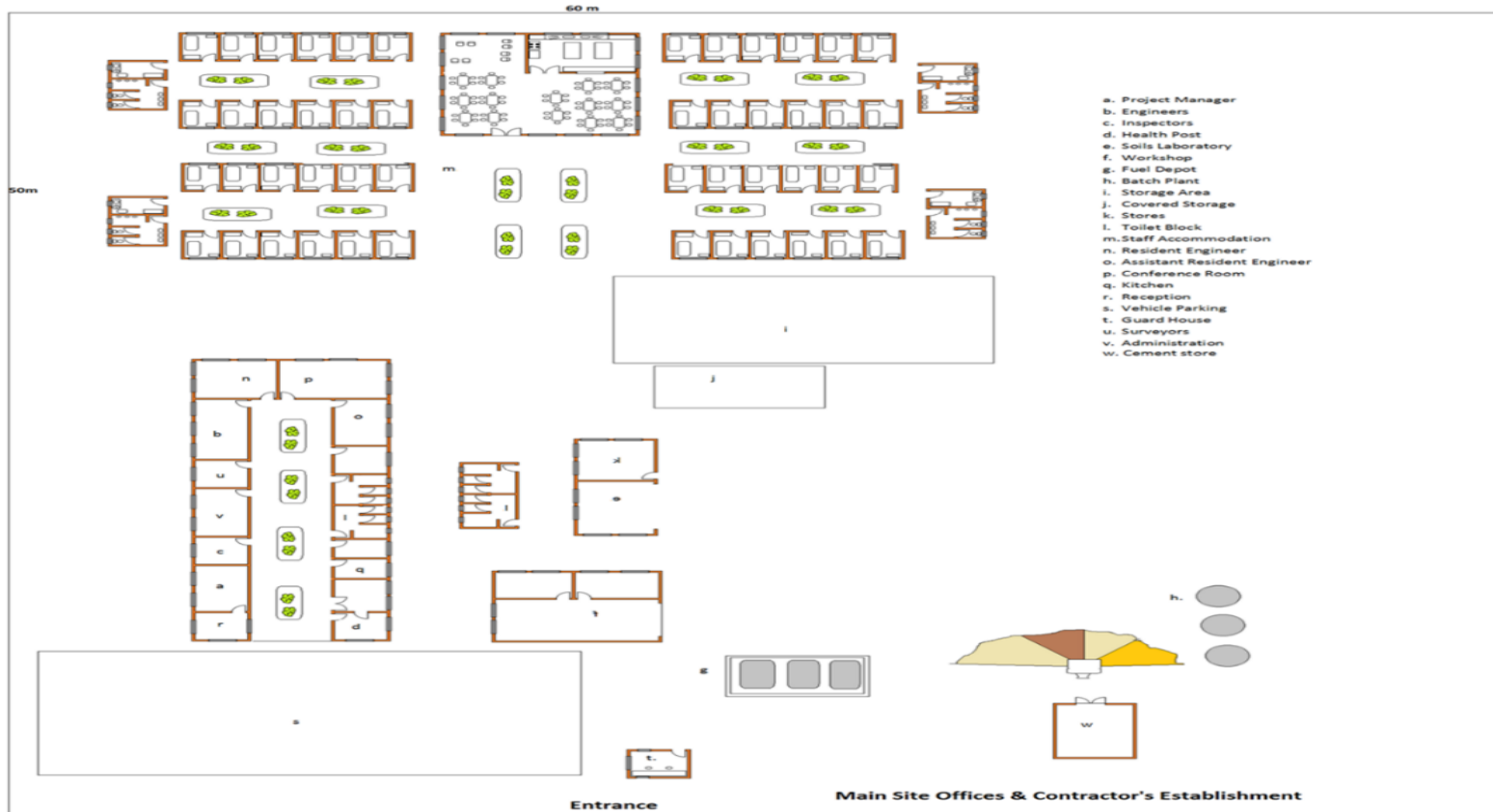
This recommendation assumes that there will be strict implementation of mitigation measures to prevent or minimize anticipated adverse social and environmental impacts. Some of these potential adverse impacts include SEA, SH, increases in sexually transmitted and infectious diseases including COVID-19, criminal activities (theft and affray, alcohol abuse and illicit drugs use, social conflict and ills, etc.). The contractor should avoid setting up labourer's camps within project villages to minimize the impacts of labour influx as outlined above, workers should commute from their homes if works are near the villages. All requisite land transfer/land use documentation will be acquired prior to the start of civil works. The following facilities and works will be carried out during camp establishment and will also be detailed in the ESIA:

- Site establishment and securitising the camp
- Water supply and electricity power (solar) connections
- Ablution facilities (use of conservancy tanks) and their maintenance and dismantling post construction
- Workshops and storage sheds, including bunded areas and 'hot works' areas
- Plant, tools and equipment
- First aid equipment
- Requisite Personal Protective Equipment (PPE) (safety clothing, shoes, dust masks, boots etc.)

- Emergency assembly point.

Figure 1 shows a typical layout for a camp site.

Figure 1: Typical Camp Site Layout



12. Potential Environmental and Social Impacts and Proposed Mitigation Measures

Table 10: Summary of Potential Positive Impacts and Enhancement Measures

Project Phase	Impact	Opportunity Enhancement Measure
Pre-Construction and Construction	Provision of unskilled, semi-skilled and skilled employment	<ul style="list-style-type: none"> • Notify community of job opportunities at start up and types and number of labourers and skilled people required. • Recruitment process to adhere to labour procedures and policies. (Employment Act CAP 47:01 Item (1). The Act advocates for equal opportunities for qualifying applicants, irrespective of gender, tribe, religion, or political beliefs.) • Advertise employment opportunities locally. • Development of a recruitment strategy (Labour Hiring Plan) that takes into consideration locally available skills. • Implementation of labour-intensive work methods rather than capital intensive work methods wherever possible. • Education and training of employees to enable skills transfer.
	Enhanced socio-economic development (livelihoods improvement)	<ul style="list-style-type: none"> • Uphold measures geared towards citizen empowerment and skills transfer. • Embark on projects social responsibility to uplift livelihoods. • Optimise and upgrade water transmission infrastructure for reticulation efficiency. • Encourage the procurement of goods and services from local service providers, disadvantaged individuals, and women.
Operation	Improved livelihoods due to water availability	<ul style="list-style-type: none"> • Systematic maintenance of the public standpipes and the related infrastructure. • Mobilising of community members to reticulate water to their plots to reduce pressure on the use of the public standpipes. • Public awareness on wise water usage and taking care of the water infrastructure • Sensitising school children on water management. • Community leadership and Social and Community Development (S&CD) Office requesting WUC to come with a programme that allows people to pay for water connection in instalments and the connection only done once they have paid off the fee. • Finding out if it is possible to install the prepaid water taps to the households to avoid people not being able to pay bills and their water supplies being disconnected, and then being faced with the payment for reconnection and the outstanding bills.

Table 11: Summary of Potential Negative Impacts and Proposed Mitigation Measures

Activity	Potential Negative Impacts	Proposed Mitigation Measures
PRE-CONSTRUCTION, CONSTRUCTION AND DECOMMISSIONING		
Mobilisation and site establishment	Potential increase in Sexual Exploitation and Abuse (SEA), Sexual Harassment (SH) and Violence Against Children (VAC)	<ul style="list-style-type: none"> - Raise awareness to sensitise the construction crew who are not from the region to respect community values and norms. - Comply with monitoring and reporting requirements as per the Codes of Conduct, including age restrictions on any sexual activity (under 18 years of age) and behaviors that constitute GBV, SEA, SH and VAC. - Conduct awareness raising sessions among workers and the community about social ills that are likely to emerge due to interaction of locals with migrant workers. - Liaise closely with the police and other crime law enforcement authorities, NGOs to address GBV, SEA, SH and VAC and other social problems that may be exacerbated by the project. - Engage a GBV service provider to conduct an awareness talk periodically (monthly) on GBV, and their prevention and to provide services to GBV survivors. - Train project-related staff and residents of the communities in behaviour obligations. To make this effective, all workers will be required to sign an Individual Code of Conduct as presented in Annex 8. Provide training and awareness sessions about the Codes of Conduct to enhance understanding among sub-project workers. - Ensure women have equal opportunity to be hired as this could help address the problem of younger women getting into relationships for financial support and being abused in that process. - Form a GBV, SEA, SH and VAC team as per World Bank’s guidelines as presented in Section 11. - Engage police in sensitization and awareness on GBV, SEA, SH and VAC to ensure they are aware of procedures in place and need for survivor-centered procedures and to participate in community and worker training.
Mobilisation and site establishment	Increased incidences COVID-19	<ul style="list-style-type: none"> - Provide wash basins with soap at a number of places within the sub-project sites and at points within the villages to prevent the spread of COVID-19 within the sub-project’s workforce and the communities within the sub-project area. - Design the contractor and labourer’s camp to avoid the spread of the disease. Conduct awareness sessions in the communities and for sub-project workers on the disease and its risks, as well as the major drivers of COVID-19 spread such as poor sanitation, physical contact and airborne transfer by formally engaging the Ministries of Health and Wellness, Nationality, Immigration and Gender Affairs to harness existing and integrate existing COVID-19 programmes into the sub-project. - Develop materials that seeks to promote awareness and good hygiene behavior and social distancing. - Engage the village clinics to provide monthly onsite health talks to provide and promote access to COVID-19 testing services. - Ensure the contractor enforces the Codes of Conduct for COVID-19 and conducts awareness training on them to ensure all workers are aware of expected behaviours. - Ensure the community is aware of the GM.
All construction activities:	Noise pollution	<ul style="list-style-type: none"> - Provide employees with full PPE including ear plugs and masks. - Reserve PPE for the visitors.

Activity	Potential Negative Impacts	Proposed Mitigation Measures
<ul style="list-style-type: none"> - Land clearing for servitude - Excavation (trenching), laying of pipes and backfilling - Construction of pump stations and storage tanks - Transportation of various project materials 		<ul style="list-style-type: none"> - Implement induction training before visitors are allowed entry into the sites. - Conduct toolbox talks for workers to raise awareness about the impacts of noise and how to minimise it. - Select equipment with lower sound power levels. - Install acoustic barriers in order to minimise the transmission of sound through the barrier. - Limit construction vehicle movement (especially trucks) to and from site to normal working hours only i.e. 6am to 6pm. - Maintain silencers on diesel powered equipment where necessary. - Maintain all forms of equipment in a systematic manner.
<ul style="list-style-type: none"> - Loading, Haulage and dumping - Excavation and trenching 	Dust nuisance and health risks	<ul style="list-style-type: none"> - Spray work areas, short access roads around pump stations and storage tanks with grey water to suppress dust. - Provide protective dust masks to workers and ensure that they are worn during all activities that generate dust. - Enforce speed limits on site in order to minimize dust pollution. - Visually monitor dust generation from work zones and implement dust suppression measures. - Minimise dust from open area sources, including storage piles, by using control measures such as installing enclosures and covers and increasing moisture content.
	Soil erosion	<ul style="list-style-type: none"> - Apply a 5 cm layer of gravel over the top of compacted trench material in areas where the soils are powdery and cannot be effectively compacted. - Implement erosion control measures such as wetting down the site to control dust, covering/screening of stockpiles, positioning stockpiles in areas that are not prone to winds. - Erect a silt curtain at the outlets at the reservoir sites, to screen runoff water - Minimise erosion during flushing by avoiding discharge areas that are susceptible to erosion and spread the flow to reduce flow velocities
	Potential trench collapse (cave ins)	<ul style="list-style-type: none"> - Employ a competent person to inspect trenching daily. - Train workers on working safely in/ around trenches and early detection of potential trench collapse. - Keep heavy equipment/ activities away from trench edges. - Identify locations of underground utilities. - Provide safe access and ingress to all excavations. This should be ladders and steps ramps at 2 km intervals and where necessary within the villages to access. - Keep stockpiles of excavated materials at minimum safe distance of 1 m from the edge of the trench. - Protect workers and trenches by use of proper techniques for shoring or shielding. - Prevent community members (especially children) and animals from entering the construction area with open trenches. - Minimise the length of open trenches at any one period and backfill trenches as soon as possible.
<p>All construction activities:</p> <ul style="list-style-type: none"> - Handling and disposal of waste 	Improper waste handling and disposal	<ul style="list-style-type: none"> - Set up a centralised waste storage area as a temporary facility. It needs to have restricted access (e.g. fencing and locked gate) and have adequate lighting. This area would be used to safely store the waste generated from all the sub-project works areas, as well as the labourer's accommodation camps, safely until disposal. It would also serve as a sorting depot for waste that can be recycled and reused. - Ensure that only the designated dumping site per village sub-project should be used for solid waste disposal. These centralised areas should

Activity	Potential Negative Impacts	Proposed Mitigation Measures
		<p>be access restricted, demarcated and organised in such a way that waste types can be sorted and the different types stored safely (on a temporary basis) before transport and disposal. Wastewater from all toilets will be collected by a reputable and certified waste handler (certified by the DWMPC) and transported to a certified Wastewater treatment facility in Sowa Town.</p> <ul style="list-style-type: none"> - Construct bunded walls with appropriate cover and ventilation at the contractor's camp, labourer's camp and construction sites for temporary containment of liquid wastes before disposal. - Arrange that liquid waste (used oils, diesel and other hydrocarbons) from the contractor's camp, labourer's camp and construction sites is collected by a reputable waste handler, who is licensed by the DWMPC. The waste should be transported to a certified handling facility. - A record (including waste manifests, waste quantities) of all waste collection, disposal methods and final destination of waste should be kept on site - Ensure that trucks hauling waste are covered and adhere to the Contractor's Traffic Management Plan. - Ensure that waste receptacles with animal-proof lids are provided at all the working sites, labourer's camp and the contractor camp site. - Establish waste recycling objectives should be established, workers should be provided with training to meet the objectives and waste receptacles should be colour-coded and properly labelled to encourage waste recycling. - Provide portable toilets onsite for both males and females during construction phase.
All construction activities	Increased incidents of veldt fires	<ul style="list-style-type: none"> - Implement fire suppression measures which include automatic and fire protection equipment such as automatic sprinkler systems, manual portable extinguishers and fire hose reels - Conduct staff training workshops on basic fire management and response procedures, and fire suppression. - Develop internal fire reporting, response procedures and fire response plan which includes neighbours. - Report all incidents of fires to the nearest Department of Forestry and Range Resources office or any Botswana Police Service station. - Monitor fires occurring along the water infrastructure route; frequency, intensity, direction and possible expansion.
All construction activities	An increase in COVID-19 and other viral disease prevalence rates	<ul style="list-style-type: none"> - Provide wash basins with soap at all the sub-project sites to prevent the spread of COVID-19 within the communities. - Design the Contractor and Labourer's camp to encapsulate all the necessary protocols to prevent the spread of the disease. - Conduct awareness sessions in the communities and for sub-project workers on the disease and its risks, as well as the major drivers of COVID-19 spread such as poor sanitation, physical contact, and airborne transfer by formally engaging the Ministries of Health and Wellness to harness existing and integrate existing COVID-19 programmes into the sub-project. - Develop materials that seeks to promote awareness, good hygiene behavior and social distancing. - Engage the village clinics to provide monthly onsite health talks to provide and promote access to COVID-19 testing services. - Ensure contractor enforces Codes of Conduct (CoC) for COVID-19 and conducts awareness training on them to ensure all workers are aware of expected behaviours. - Ensure the community is aware of the GM.

Activity	Potential Negative Impacts	Proposed Mitigation Measures
All construction activities	Possible increase in STIs and HIV/AIDS infections	<ul style="list-style-type: none"> - Set up of HIV and AIDS structures in the communities (project areas) to intensify HIV/AIDS awareness campaigns in the district - Provide STI screening and treatment on-site for early diagnosis. - Ensure availability and access to condoms in the workplace. - Provide behavioural change awareness materials on-site and in the nearby communities. - Implement a project specific CoC on HIV/AIDS.
<ul style="list-style-type: none"> - All construction activities - Land clearing for servitude - Excavation (trenching), laying of pipes and backfilling - Construction of pump stations, and storage tanks - Transportation of various project materials 	Potential accidents and injuries (Occupational Health)	<ul style="list-style-type: none"> - Workers should have a standard overall, safety boots and hard hats to be allowed access to the construction site. It should be the mandated standard PPE for every worker and its use should be monitored. - Implement a confined space entry program that is consistent with applicable national requirements - Use fall protection equipment when working at heights - Maintain work areas to minimise slipping and tripping hazards. - Use proper techniques for trenching shoring. - Implement fire prevention measures in accordance with internationally accepted standards. - Enforce prudent handling and storage of hazardous chemicals. - Provide various PPE for different hazardous work environment such as dust masks, gloves, safety goggles, ear plugs, safety harness etc. - Train workers on safety measures to be implemented on site. - A worker proficient and certified in first aid should always be available on site. - Make available a fully equipped first aid kit in all the construction vehicles and at the site office, as well as the labourer's camps. - Provide workers with protective clothing such as boots and gloves.
<ul style="list-style-type: none"> - Excavation (trenching), laying of pipes and backfilling 	Encroachment of pipe infrastructure into people's residence/properties due to inadequate servitudes	<ul style="list-style-type: none"> - Establish a good working relationship to allow access for maintenance purposes (where pipeline is too close to private property) - Physically inspect plots against layout plans, and where there are discrepancies, undertake surveying of the plots and produce updated layout plan. - In case of relocations; compensation of affected plot owners should comply with Compensation Guidelines for Tribal Areas 2010 and the prepared Resettlement Policy Framework.
	Disruption of public routes or access	<ul style="list-style-type: none"> - Restore, to the extent possible, any public infrastructure or amenities that are disrupted to enable continued access. - Construct pedestrian crossing points at 2 km intervals along trenches. - Provide temporary crossing over the excavated trenches to facilitate ease of access. Red danger tape should be placed along the trenches and it should be visible to residents and motorists. - Backfill open trenches as soon as possible to avoid injuries to people, livestock and wildlife in the project area. - Mark-off open trenches with danger warning tapes. - Cordon-off excavated areas with reflective danger warning signage and trenches should be covered within 12 hours. - Provide an avenue for complaints by the public (i.e. GM) and make the public aware of this mechanism.
<ul style="list-style-type: none"> - All construction activities - Land clearing for servitude - Excavation (trenching), laying of pipes and backfilling 	Loss of vegetation (clearing of rights-of-way for pipeline and infrastructure construction)	<ul style="list-style-type: none"> - In the bid to reduce amount of vegetation clearing, and hence project's ecological footprint, consider aligning the pipeline route with existing vegetation-cleared routes, where technically feasible. For example, along existing roads, cut lines, firebreaks, water pipelines and disease control fence lines. - Perform a comprehensive systematic inventory of cleared vegetation with particular emphasis on plants of notable conservation significance,

Activity	Potential Negative Impacts	Proposed Mitigation Measures
- Construction of pump stations, tanks and reservoir		<ul style="list-style-type: none"> i.e. rare species and IUCN Redlist classified species, if there are any within the sites. - Where practical, adjust the water pipeline to avoid large adult protected plant species, e.g. adult mowana (<i>Adansonia digitata</i>) tree.
- All construction activities and water leakages along the project infrastructure	Wildlife habituation and modification of behaviour	<ul style="list-style-type: none"> - Develop a comprehensive water leaks' monitoring and detection system for early warning. - Effectively maintain and repair water infrastructure (leaks). - Monitor spatio-temporal distribution of wildlife populations along the water infrastructure. - Monitor patterns and trends of wildlife mortality due to vehicle collision along the pipeline route.
- All construction and decommissioning activities	Elevated risk of increased incidents of negative human-wildlife interaction (HAC)	<ul style="list-style-type: none"> - Implement a proper waste management system (on-site processing, recycling, wildlife proof waste receptacles, and appropriate disposal at designated sites). - Conduct staff training workshops/seminars on HAC (background, presentation, consequences and response procedures). - Routinely maintain and repair of leakages as soon as they occur. - Display warnings signs e.g. "Wild Animals are Dangerous do not feed or Approach too Close". - Develop and implement HAC and wildlife habituation monitoring system. - Report all incident of HAC to the nearest Department of Wildlife and National Parks office or Police Station.
Clearing for the pipeline, storage tanks, pump stations and camp sites	Transmission mains area Uninformed destruction of archaeological materials	<ul style="list-style-type: none"> - Ensure an archaeologist is on site after clearing the vegetation and during construction to guard against uninformed destruction of archaeological materials - Salvage archaeological / paleontological chance discoveries.
OPERATION AND MAINTENANCE		
Water extraction from the boreholes	Groundwater over-mining (depletion)	<ul style="list-style-type: none"> - Avoid groundwater resources pollution from the surrounding area. - Find long-term alternative water sources for sub-project villages that can be used to help replenish aquifers. Deriving water from other sources would give the aquifers time to refill instead of pumping too much water from them at once. - Monitor groundwater usage by WUC in the area and activities that can contribute to the water resource pollution. - Optimise pumping rates and frequency of pumping of project boreholes by WUC to avoid over pumping.
Operation of the water scheme	Water supply disruptions due to vandalism/theft of infrastructure	<ul style="list-style-type: none"> - Raise community awareness on pipe vandalism and its consequences such as water shortage and the associated reduction in water pressure. This should be done by WUC through the village leadership. - Provide lockable manhole covers and locks for all the manholes including valve chambers. - Monitor telemetry and SCADA to identify pipe leaks and urgently respond to the leakages to minimise the subsequent pipe vandalism by wildlife especially elephants. - Provide an electric perimeter fence and provide metal spikes embedded on a perimeter concrete apron to deter elephants.

Table 12: Summary of Action Plan for Monitoring Against Potential Adverse Impacts

Potential Environmental Impacts	Parameters to be Monitored	Location	Key Performance Indicator	Method of Monitoring	Responsible Agent for Monitoring	Frequency of Measurement	Reporting Mechanism	Threshold or Existing Standard	Recommended Action when Threshold is Exceeded
WASTE MANAGEMENT									
Improper waste handling and disposal	<p>Waste Management</p> <p>Section 34 of the Waste Management Act makes it an offence to indiscriminately dump litter at a place not gazetted as a dumping site</p> <p>Waste Management Procedure Section 5 Item 5.1; Waste segregation</p> <p>- Colored bags</p>	Construction sites, offices and camp sites	Waste Collection Manifest	<p>Indication of sorting at source</p> <p>Indication of collection by DWMPC licensed operators</p> <p>Record of frequency of collection and disposal at dumping sites</p>	<p>Enviro Solve</p> <p>Site Agent</p> <p>Tribal Administration</p> <p>Sowa Town Council and Tutume Sub-District Council</p> <p>Department of Waste Management and Pollution Control (DWMPC)</p>	Weekly	<p>ESMP monthly monitoring report</p> <p>Site Agent's Report</p>	Waste Management Act, Public Health Act	Work should be halted until proper clean-up is done

Potential Environmental Impacts	Parameters to be Monitored	Location	Key Performance Indicator	Method of Monitoring	Responsible Agent for Monitoring	Frequency of Measurement	Reporting Mechanism	Threshold or Existing Standard	Recommended Action when Threshold is Exceeded
	- Specific containers								
SOCIAL MANAGEMENT									
Disruption of public routes or access	Access disruption to public routes	Project villages	Length and duration of open trenches (trenches should be 2 km and closed within 12 hours) Provision of temporary crossings Presence of danger warning tapes	Visual inspection and use of measuring wheel to measure the length Visual inspection of temporary crossings and danger warning tapes	Enviro Solve Site Agent Sowa Town Council and Tutume Sub-District Council	Daily	ESMP monthly monitoring report Site Agent report	No blockage for more than 12 hours	The contractor should provide temporary access or backfill to unblock access
Provision of unskilled, semi-skilled and skilled employment	Number of workers from the project villages Employment Act CAP 47:01 Item (1) – The Act advocates for equal opportunities for qualifying applicants, irrespective of gender, tribe,	Construction sites and camp sites/offices	At least 60% of unskilled workers are from project villages and should include the vulnerable community members At least 25% of vulnerable community hired At least 25% women are hired	Records of people employed	Enviro Solve PIU Tribal Administration Sowa Town Council and Tutume Sub-District Council	Monthly	Environmental Officer through Monthly monitoring reports and submission to DEA	At least 60% of all workers are from the project villages At least 25% of vulnerable community hired At least 25% women are hired	The Construction work should be stopped until people from the project villages are hired

Potential Environmental Impacts	Parameters to be Monitored	Location	Key Performance Indicator	Method of Monitoring	Responsible Agent for Monitoring	Frequency of Measurement	Reporting Mechanism	Threshold or Existing Standard	Recommended Action when Threshold is Exceeded
	religion, or political beliefs								
Enhanced socio-economic development (livelihoods improvement)	Purchasing power and sales of goods and services Employment Act CAP 47:01 Item (1) – The Act advocates for equal opportunities for qualifying applicants, irrespective of gender, tribe, religion, or political beliefs	Entire project area	Number of people employed by the project	Review of employment records	Enviro Solve PIU	Monthly	Environmental Officer through Monthly monitoring reports and submission to project committee	Employment Act	Assess requirement and comply with the ESMP
Erosion of societal norms & values and Gender Based Violence (GBV)	GBV incidents	Entire project area	Number of GBV cases recorded	Observation Document review/list of GBV cases-GM monitoring log Sport checks with workers/community to ask them their views about how the project is	Enviro Solve PIU and CLO SHE Officer Social Worker Botswana Police Services	Daily	Environmentalist; Monthly monitoring reports to the project committee PIU monthly reports Community liaison	Requirement of ESMP, EA Act 2010 Requirement of GM GM Requirements	Assess requirement and comply with the ESMP GM must be properly used and all GBV cases recorded and properly resolved

Potential Environmental Impacts	Parameters to be Monitored	Location	Key Performance Indicator	Method of Monitoring	Responsible Agent for Monitoring	Frequency of Measurement	Reporting Mechanism	Threshold or Existing Standard	Recommended Action when Threshold is Exceeded
				affecting their norms and values			monthly report		
HEALTH AND SAFETY MANAGEMENT									
Potential accidents and injuries	Accidents and incidents	Entire project area	Number of accidents and incidents	Observation Review of accident and incident reports	Enviro Solve SHE Officer	Daily	ESMP monthly monitoring report Grievance Mechanism Logbooks Site Agent Report	Factories Act Public Health Act Mines Quarries and Machinery Act	The contractor should engage Occupational, Health, Safety and Environment specialists to conduct awareness on work related accidents
Potential trench collapse (cave-ins)	Unprotected/unstable open trenches	Throughout the construction site where there is trenching	Number of cave-ins/collapse of trenches Percentage of protected trenches against total excavations dug Distance of placement of stockpiles and heavy equipment from trenches	Measurement (Tape measures and measuring wheel) Observations	Enviro Solve Site Agent	Daily	ESMP monthly monitoring report Site Agent report	All dug trenches	The contractor should be ordered to protect the trench walls or backfill it

13. Estimated Budget for Implementation of ESMP

It is estimated that the mitigation measures at the pre and construction stages will cost a total of **P 6, 326, 395.00 (US\$ 613,139,50)** which is about 3 percent of the total sub-project cost.

14. Roles and Responsibilities for ESMP Implementation

Central to the implementation of the ESMP is the designation of roles and responsibilities. This does not only encourage accountability but also saves on resources such as time and minimizes or eliminates duplication of efforts. The overall responsibility of implementing this ESMP is with the PIU under WUC. Other institutions will also play important roles, such as Government Departments (Department of Land Board, Gender Affairs Department etc.), Non-Governmental Organisations, and parastatals (Botswana Power Corporation).

Some institutions have also been consulted to administer the project to achieve its objectives and minimise adverse impacts. Government institutions to implement specific monitoring and implementation roles according to their mandate include the Ministry of Youth, Empowerment, Sports and Culture for the engagement of the youth in the development process of especially the vulnerable communities and the Ministry of Health and Wellness through their District Health Management Teams (DHMT) who are responsible for educating communities on all health issues including, communicable and non-communicable diseases. The World Bank will oversee the implementation of the project's environmental and social instruments and will assist with technical capacity building. In addition, WUC will provide technical support and participate in training and sensitization of stakeholders to enhance understanding of the national and the Bank's environmental and social safeguard instruments.

15. Grievance Mechanism

The project may give rise to complaints from community members, stakeholders, project affected persons and the contractor's employees. These complaints need to be attended to and resolved as quickly as possible at the project level. In this regard, Community Liaison Officers (CLOs) will be in place at project sites and Grievance Resolution Committee (GRC) will be established with a clear term of reference to address grievances. **Community Liaison Officers.** The PIU will in consultation with respective communities appoint Community Liaison Officers (CLOs) in the specific sub-project areas. The Community CLOs will be situated in the project area villages/settlements where there are project works, will be designated to receive, review, record, and address project related complaints. Every two weeks, CLOs will consolidate complaints and submit to the GRC. Their contact information will be published and communicated via public announcements and information sharing about the project, (radio, television and newspapers, community meetings, etc.), to conduct stakeholder outreach before during and after project implementation with respond to any grievances or complaints received.

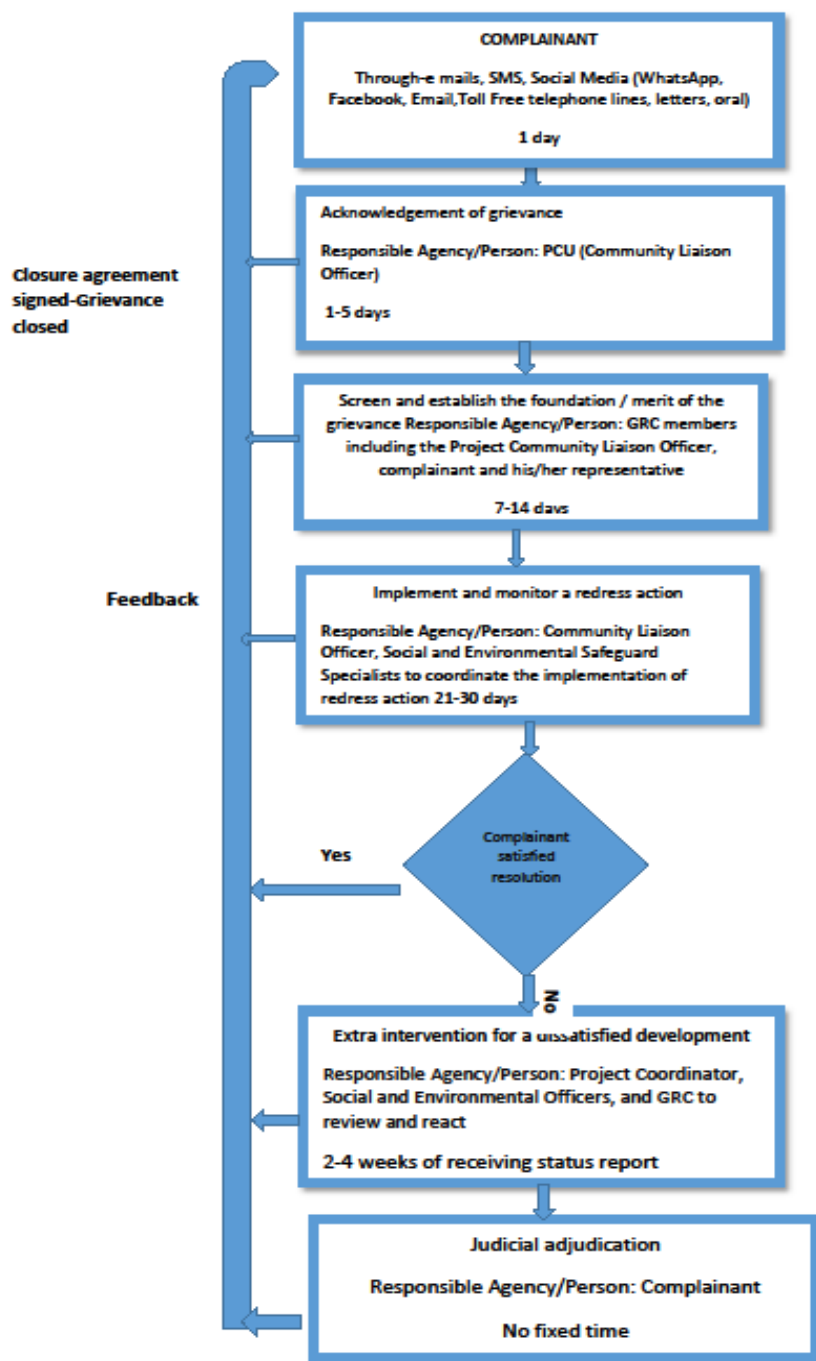
Membership of the GRC:

- Contractors Representative
- Land Board Representative
- Water Utilities Corporation (WUC) Representative (Management Centre)
- Community Representatives (two representatives; one male and one female in vulnerable communities with one being a Mosarwa)

- Social Safeguards Specialist – PLO
- Environmental Specialist – PLO
- Community Liaison Officer (Secretary)
- Social Worker
- Police Officer
- Community Development Officer and
- Dukwi Refugee Camp Representative

A Grievance Mechanism (GM) for conflict prevention and resolution has been devised in consultation with the affected communities. **Figure 2** shows the GM Process.

Figure 2: Grievance Mechanism Flowchart



16. Public Disclosure

This ESIA/ESMP will be disclosed to the Sowa Water Supply Scheme communities and all affected stakeholders after it has certified all the necessary local requirements and World Bank clearance. Hard and soft copies will be made available to the VDC, Kgosi, Contractor, CLO and will be uploaded on WUC's website, as well as external website of World Bank. There will also be a phone number that will be given to the VDC, which will also be listed on the WUC website which the public can call to request a copy. It will also be disclosed through the local newspaper for other stakeholders.

17. Conclusion and Overall Recommendations

Based on the analysis and assessment of the existing environment, potential environmental and socio-economic impacts of the Sowa Water Supply sub-project on the project area, this ESIA study concluded that:

1. The construction of the proposed water supply infrastructure will enhance water availability, improve living conditions and sanitation conditions, and enhance the quality of life for the sub-project communities.
2. The measures proposed for the prevention, control and handling of environmental pollution and risks, as well as the social risks, will be adequate to avoid or reduce the potential negative impacts and enhance the positive impacts if implemented.
3. During the operation of the sub-project, there will be some adverse environmental and socio-economic impacts, but these can be mitigated and are considered to be manageable in comparison to the environmental and social benefits that the proposed Sowa Water Supply Scheme potentially will bring to its beneficiaries.

Recommendations

- Contractor should notify communities of job opportunities at start up and types and number of labourers and skilled people required.
- The Contractor to be encouraged to procure goods and services from local service providers.
- The Contractor should bring mostly skeletal staff composed of semi-skilled and skilled workers and the unskilled labour should be sourced from the project villages.
- Find long term alternative water sources for sub-project villages that can be used to help replenish aquifers. Deriving water from other sources would also give aquifers time to refill instead of pumping too much water from them at once.
- Monitor groundwater usage by WUC in the area and activities that can contribute to the water resource pollution.
- Optimise pumping rates and frequency of project boreholes by WUC to avoid over pumping.
- Geotechnical investigation studies should be conducted at the reservoir and RO plant sites prior to construction to capture various issues including potential landslides and ground subsidence.
- The access road to the sub project boreholes should be improved especially where there is black cotton soil to make it passable especially during the rainy season.
- In a bid to reduce amount of vegetation clearing, and hence project's ecological footprint, consider aligning the pipeline route with existing vegetation-cleared routes, where technically feasible. For example, along existing roads, cut lines, firebreaks, water pipelines and disease control fence lines.

- In case of relocation, compensation of affected plot owners should comply with Compensation Guidelines for Tribal Areas 2010 and The Environmental and Social Safeguard Policies of the World Bank Group.
- Personal Protective Equipment (PPE) should be supplied to suit the work environment i.e.
 - dust masks should be a standard for working in dusty conditions,
 - gloves should be supplied for lifting purposes,
 - ear plugs should be provided for noisy environments especially those that exceed 75 dB
 - safety goggles should be provided when undertaking activities hazardous to the eyes
 - safety harnesses should be provided for work on elevated heights such as elevated water tanks.
- Safety toolbox talks should be conducted weekly, and a record of minutes should be kept and produced when required

With the above recommendations, best management practices and proper implementation of the developed environmental and social management/motiroing plan the sub-project will not only have adverse impacts mitigated but the positive impacts will be enhanced.

1. INTRODUCTION

The Government of Botswana through Water Utilities Corporation (WUC) is undertaking the Botswana Emergency Water Security and Efficiency Project (BEWSEP) with funding from the World Bank. The BEWSEP is a P1.45 billion (USD145 million) project funded by World Bank (WB). The WUC is responsible for implementing the project and ensuring compliance with the environmental, social and procurement requirements of the Bank. The Sowa Water Supply Scheme is a sub-project under this project. The environmental and social policies of the World Bank requires the project to conduct an Environmental and Social Impact Assessment (ESIA) with an Environmental and Social Management Plan (ESMP) in line with World Bank's Operational Policy Procedures and Standards.

Botswana, an upper middle-income country, has been one of the world's fastest growing economies. It also has a semi-arid climate with low rainfall levels (at 250 – 450 mm), which is unevenly distributed (with 5 year deficits recorded in some areas), and highly variable from year to year. Most rivers are seasonal, and despite limited availability, groundwater abstraction has increased from less than 150 cubic mega meters (Mm³) in 1990 to 195 Mm³ in 2013/14. Groundwater now accounts for three quarters of the country's water requirements, particularly in western Botswana, where groundwater is the main resource. In general, water resources are constrained, fragile, and subject to many competing demands: in 2013 agriculture and mining were the main users, accounting for 42 percent and 23 percent respectively, while domestic consumption accounted for 25 percent. As water is central to Botswana's continued economic success and sustained development gains, demand is projected to rise further. However, in the context of chronic drought and climate change, managing rising demand is a priority, because Botswana is one of four Southern Africa nations that could become "highly water stressed by 2040" under a business-as-usual scenario.

In order to offset growing reliance on its groundwater resources, the Botswana Government has constructed a number of dams and has developed several water transfer schemes, which includes BEWSEP with several sub-projects. Most of these sub-projects are located in the northern part of Botswana. BEWSEP includes critical water supply investments in water supply to urban and rural areas, that are needed to mitigate drought impacts (under Component 1), and wastewater treatment investments needed to comply with effluent standards and prevent pollution of vital downstream water sources (under Component 2).

Water Utilities Corporation (WUC) intends to improve availability of water supply and efficiency services in Sowa Township, the villages of Nata, Maposa, Manxotae, Sepako, Dukwi, Dukwi Refugee Camp, Mosetse and Kutamogoree, as well as the BotAsh Mine near Sowa through the World Bank funding under the BEWSEP. To actualize this infrastructure improvement, WUC engaged Enviro Solve Consultancy (Pty) Ltd (Enviro Solve Consultants) to conduct this ESIA and ESMP report for the Sowa Water Supply Scheme.

1.1 BEWSEP Description and Development Objective

Given the current low water security, limited-service coverage and high-water losses; the Government of Botswana has applied for a loan with the World Bank for implementation of the BEWSEP. The project will be implemented from 2017 to 2023. The project development objective is to improve availability of water supply in drought vulnerable areas, increase the efficiency of WUC, and strengthen wastewater management in selected systems. The three components of the project are:

Component 1: Improve availability of water supply and efficiency of services,

Component 2: Improve wastewater and sludge management; and

Component 3: Sector reform and institutional strengthening.

Sowa Water Supply Scheme (sub-project) is being implemented under Component 1. According to World Bank environmental screening, BEWSEP is classified as “Category A” because it is likely to have significant environmental impacts that are sensitive, diverse, or unprecedented hence this sub-project is assessed thus. These impacts may affect an area broader than the sites or facilities subject to physical works. This Environmental and Social Impact Assessment (ESIA) study examines the project’s potential negative and positive environmental impacts, compares the feasible alternatives (including the "without project" situation) under the sub-project, and recommends management measures needed to either prevent, minimize, mitigate, or compensate for adverse impacts while improving environmental performance. Project

1.2 Description of Sowa Water Supply Scheme

The sub-project development objective is to improve availability of water supply in Sowa Township, the villages of Nata, Maposa, Manxotae, Sepako, Dukwi, Dukwi Refugee Camp, Moseitse and Kutamogoree, and the BotAsh Mine. This sub-project will improve water supply for about 24,192 (projected population for 2020) beneficiaries in the aforementioned localities and for a projected total of 35,434 beneficiaries by the year 2041. The Dukwi Wellfield is the main source of water supply in the Dukwi region, supplying the main population centres of Sowa Township, Nata and Dukwi villages in addition to providing process water to BotAsh Mine, a supplier of natural sodium products in northern Botswana.

The existing wellfield was developed in 1985 and comprised 15 boreholes. There are currently four operational boreholes. With an average output of 4.7 MI/day, at an average running duration of 22 hours per day (**Table 13**). The boreholes have an average depth of 100 m.

Table 13: Operational Boreholes

Borehole No.	Operational Yield (m³/hr)
BH 7675	60
BH 7678	65
BH 7687	45
BH 7647	50
Total	220 m³/hr

As recommended in the National Water Master Plan Review (NWMPR 2006), the maximum sustainable daily abstraction from the Dukwi Wellfield is 3.9MI/day. The current abstraction of 4.7 MI/day on average, is therefore an unsustainable long-term water supply solution. This abstraction scenario is also likely to result in encroachment of low quality (saline) groundwater and aquifer depletion.

The proposed sub-project entails the following permanent infrastructure:

- Design and construction of pipelines including (start and end points of the pipeline are listed):
 - Dukwi Waterworks to Dukwi village with a take-off to Dukwi Refugee Camp
 - Dukwi village to Moseitse East
 - Moseitse East to Kutamogoree
 - Dukwi Waterworks to Nata Waterworks
 - Nata Waterworks to Manxotae with a take-off to Maposa
 - Manxotae to Sepako

- Dukwi Waterworks to Sowa Waterworks
- Design and construction of infrastructure including an/ a:
 - Elevated tank at Kutamogoree
 - Pump station at Moseitse East
 - Elevated tank at Dukwi East
 - Elevated tank at Dukwi Village
 - Pump station at Dukwi Waterworks
 - Ground level tank at Nata Waterworks
 - Elevated tank at Nata Waterworks
 - Pump station at Nata Waterworks
 - Demolition and removal of obsolete infrastructure at Nata Waterworks
 - Control valve chamber to Maposa elevated tank
 - New elevated tank at Manxotae
- Design of the SCADA and telemetry system to link in with the existing system at Dukwi Water Works and wellfield. The following items will be monitored:
 - Flow rate, instantaneous and cumulative;
 - Pump delivery pressure;
 - Pump status, on/off;
 - Motor condition, current drawn, and
 - Water level in borehole
- Design and construction of Reverse Osmosis (RO) water treatment plant.
 - Brine disposal ponds
 - Associated civil works for installation of the modular RO units
 - Pipeline between the RO plant and the brine disposal ponds
 - Modular RO plant

1.3 Rationale of the Sub-Project

According to the NWMPR (2006), the maximum sustainable daily abstraction from the Dukwi Wellfield is 3.9 MI/day. Therefore, the current abstraction of 4.7 MI/day on average is not a sustainable long-term water supply solution. This abstraction scenario is likely to result in encroachment of low quality (saline) ground water and aquifer depletion. The time series graphs show that the concentrations of Sodium (Na), Total Dissolved Solids (TDS) and Calcium (Cl) have increased over time, with the TDS and Na concentrations exceeding the BOS32:2015 drinking water quality standards (Nicholas O'Dwyer, 2021). The sub-project should come up with a long-term sustainable abstraction solution and to ensure that the water quality consistently meets the BOS32:2015 drinking water quality standards.

Consultations with the project area communities also highlighted the high salt content of the water. The community highlighted damages to their appliances as a result of clogging by impurities from the water. In a similar way pipes are affected, resulting in bursts and water loss, with subsequent disruptions to water supply.

The existing infrastructure is dilapidated, and breakdowns are common which result in water losses along the system and further disrupts water supply. Leaks are common along the pipeline, and some are exacerbated by elephants which are active around the area. Leaking pipes result in non-revenue water losses when breakages on pipelines are not repaired promptly, particularly when they cannot be reached during the rainy season.

There are power outages during the rainy season due to lightning and this interrupts water supply. There is no provision for standby power generation at the boreholes.

The access/service road along the pipeline to the Wellfield is impassable during rainy season. Upgrading of the road was considered as too costly in the past. Infrastructure cannot be maintained during rainy season, potentially resulting in water shortages if infrastructure breakdowns occur at the Wellfield when the road is impassable.

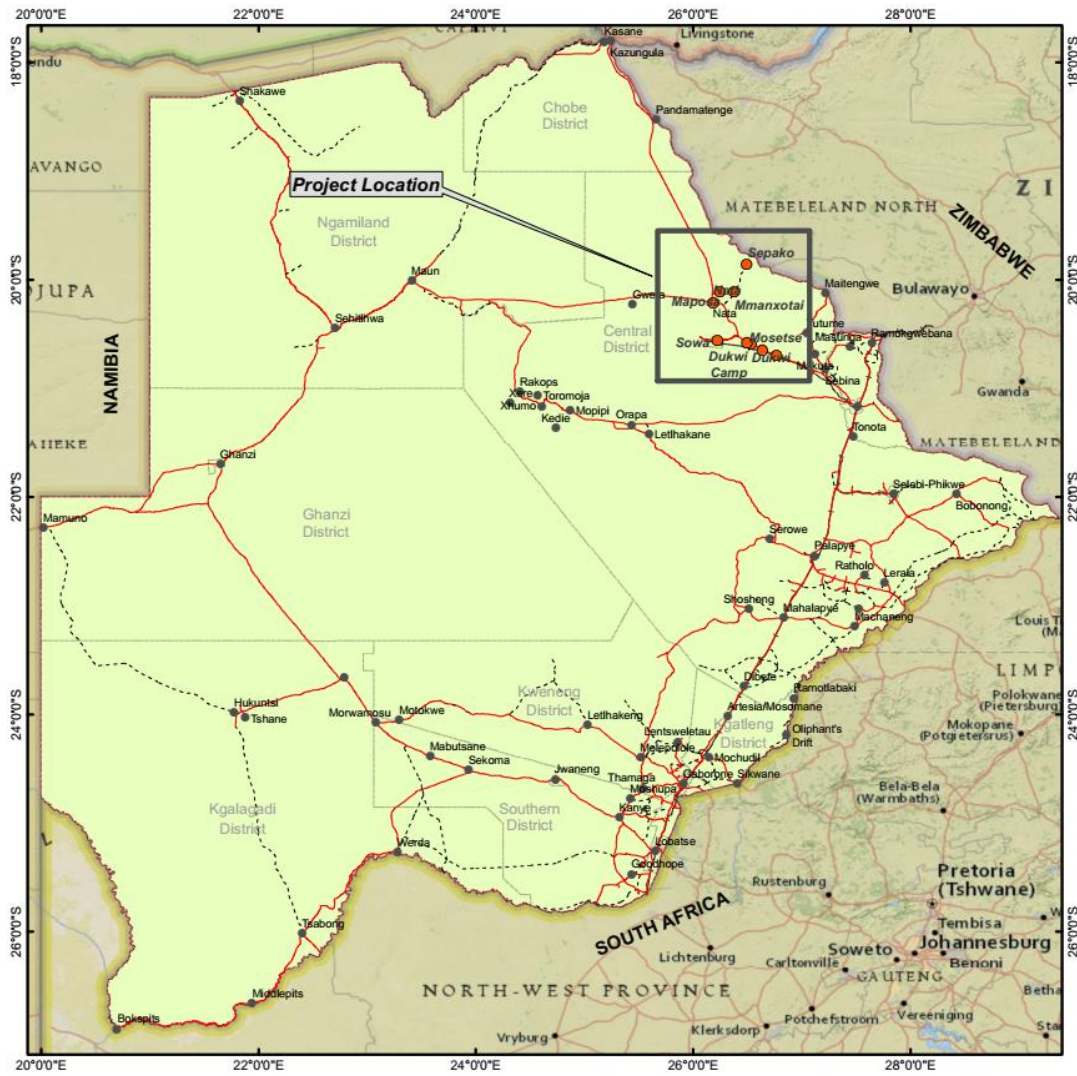
1.3.1 Objectives and Scope of ESIA

Apart from aligning the proposed sub-project with the requirements of the World Bank's Operational Policies on Environmental Assessment (OP 4.01) and the national EA Act No. 10 of 2011, the overall purpose of this ESIA study will also seek to:

- Assess and provide a description of the environmental and social baseline of the project area, including Vulnerable Communities (VC).
- Manage COVID-19 procedures/measures through a plan into the health and safety process of procurement documents and contracts. The guidelines on consultations during COVID-19, among others are specified in the ESMP.
- Identify and evaluate all potential archaeological, environmental, and social impacts and risks.
- Develop an ESMP that contains management actions and mitigation measures to eliminate or reduce potential negative environmental impacts and enhance potential positive impacts, as well as for the monitoring of the required environmental and social management tools.
- Develop project mitigation measures, Codes of Conduct, Implementation of ESHS and OHS Standards, Preventing Sexual Exploitation and Abuse (SEA), Sexual Harassment (SH), and Violence Against Children and Environmental Codes of Practice (ECOP) that address the potential environmental and social impacts and risks of the sub-projects and ensure these are reflected in bidding documents and Contractor's ESMP. These should also address potential project impacts for vulnerable communities, marginalized groups, and individuals
- Identify, provide mitigation and monitoring measures for social and environmental risks, with particular attention on vulnerable and disadvantaged individuals and groups.
- Propose costs, include a Grievance Mechanism (GM) and responsibilities for mitigation and monitoring.
- Identify and review the relevant legislative and planning requirements for the proposed sub-project.
- Undertake a public participation process with all the relevant stakeholders to inform them about the proposed project, and solicit and address their views and concerns about the project, as well as solicit their views on a project-level GM.
- Determine the environmental and social monitoring and reporting requirements, emergency response procedures, institutional or organization arrangements, and capacity development measures and budget to ensure the implementation of the ESMP.

1.3.2 Project Location

The proposed Sowa Water Supply Scheme entails Sowa Township, the villages of Nata, Maposa, Manxotae, Sepako, Dukwi, Dukwi Refugee Camp, Moseitse and Kutamogoree, BotAsh Mine and Dukwi Wellfield. The project area is located in the Central Tutume Sub-District which is part of the Central District of Botswana. The project areas are located between Kutamogoree and Sepako villages and accessible via the main A3 tarred road connecting Francistown City with the main tourism towns of Maun and Kasane (**Maps 1-1 and 1-2**).



PROJECT:
SOWA WATER SUPPLY SCHEME UPGRADE

TITLE:
PROJECT LOCATION IN NATIONAL CONTEXT

- Legend**
- Beneficial Settlement
 - Town/Village
 - Tarred Road
 - - - Gravel Road
 - +— Railway line

MAP DATE: 10/2021

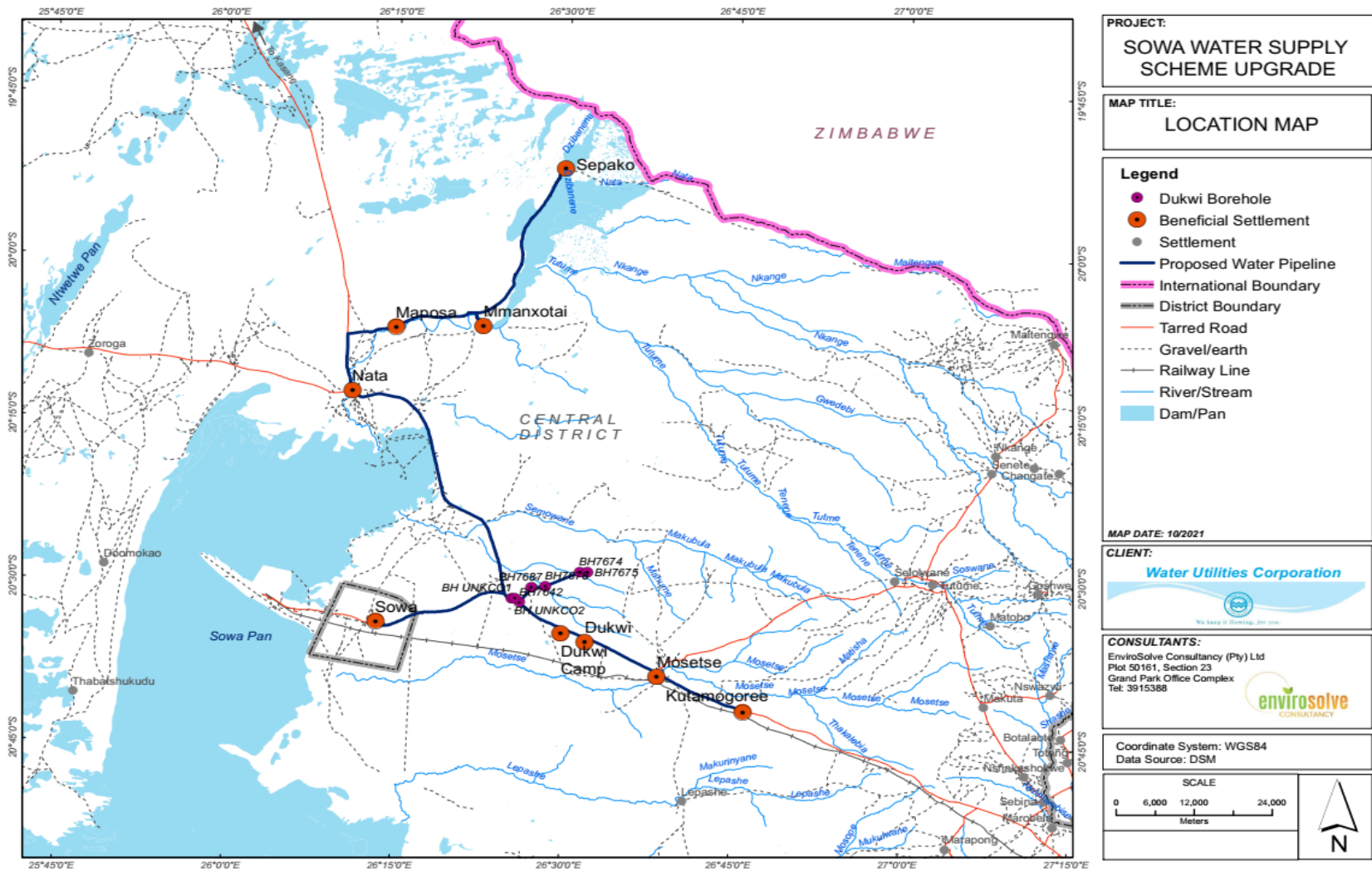
CLIENT:
Water Utilities Corporation

CONSULTANTS:
EnviroSolve Consultancy (Pty) Ltd
Plot 50161, Section 23
Grand Park Office Complex
Tel: 3915388

Coordinate System: WGS84
Data Source: DSM & ESRI

SCALE
1:5,500,000

Map 1-1: Regional Location



Map 1-2: Project Location

1.3.3 Study Approach and Implementation Schedule

To facilitate attainment goal of the study and the scope of work; an all-inclusive approach to the ESIA study has been adopted.

Overall, the sub-project project entails assessment stages namely: Inception, construction, decommissioning and the defects liability phase see **Figure 2**.

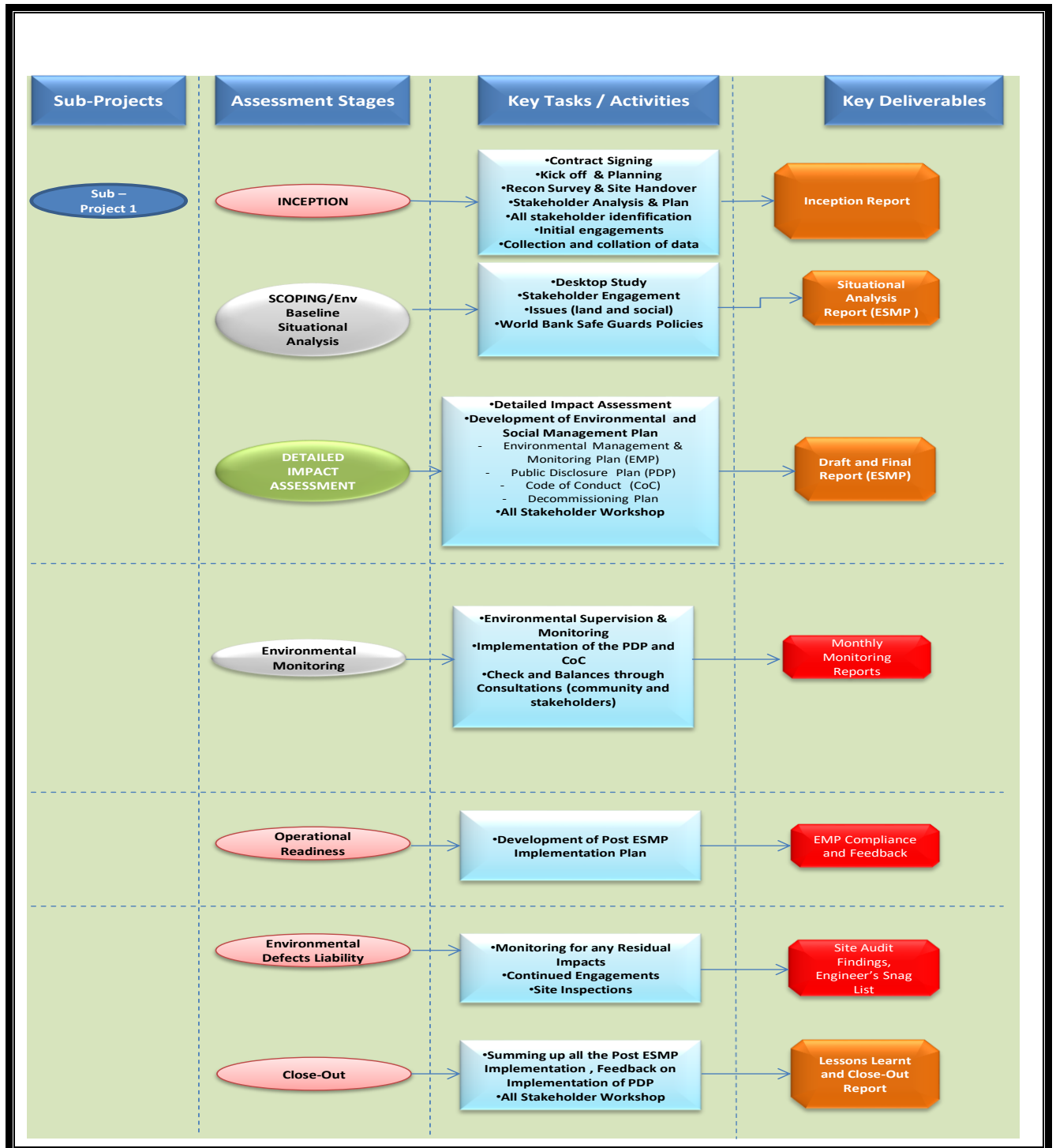


Figure 2: Schematic Presentation of Approach

2. PROJECT DESCRIPTION OF SOWA WATER SUPPLY SCHEME

2.1 Overview

Botswana and the project area in particular has been suffering from water scarcity due to the high temperatures and low sporadic rainfall. The high evaporation rates, low and variable rainfall makes surface water unreliable hence the country's dependence on underground water to sustain the domestic demand. As a result of this water scarcity and intermittent rainfall, the Government of Botswana through the WUC embarked on a project to alleviate existing water supply shortage and commissioned Gibb Consultants in 2009 and 2014 to carry out the upgrade of the Sowa Water Supply Scheme. However due to unavailability of funds, the project was shelved and its implementation postponed. WUC has appointed Nicholas O'Dwyer Ltd (NOD) to provide consultancy services to prepare detailed engineering designs of the Sowa Water Supply Scheme and to supervise its construction.

A planning horizon was set based on previous reports, the CSIR guidelines for Human Settlement Planning and Design (South Africa) to estimate water demands. A "moderate" development scenario was used with an average consumption rate of 80l/capita/day. The current demand for the BotAsh Mine was taken to be 1 MI/day and it has been assumed that the average demand will grow by 25% over the 21-year period to 2041. However, BotAsh's 2035 water demand will far exceed the 25% allowed since they require 6.936 MI/day. This is not taken into account by the current designs. The 2020 and 2041 water demand figures are shown in **Table 14**.

Table 14: Water Demand Projections

	Supply Area	2020-Water Demand (MI/d)	2041-Water Demand (MI/d)	% increase in 20 year horizon to 2041
A.1	Sepako	0.06	0.10	48%
A.2	Manxotae	0.06	0.09	48%
A.3	Maposa	0.04	0.06	48%
A.4	Nata	0.64	0.94	48%
A	Total Dukwi Water Works (WW) to Nata	0.80	1.19	48%
B.1	Sowa Township	0.34	0.51	48%
B.2	BotAsh Mine	1.00	1.25	25%
B	Total Dukwi WW to Sowa	1.34	1.76	31%
C.1	Dukwi Refugee Camp	0.08	0.08	0%
C.2	Dukwi Village	0.33	0.48	48%
C	Total Dukwi WW to Dukwi	0.41	0.56	39%
D.1	Mosetse (New)	0.17	0.25	48%
D.2	Kutamogoree (New)	0.22	0.32	48%
D	Total Dukwi WW to New Villages	0.39	0.57	48%
E	Total for Scheme	2.94	4.08	39%

The Dukwi Wellfield is the main source of water supply in the Dukwi region, supplying the main population centres of Sowa Township, Nata and Dukwi villages in addition to providing process water to BotAsh, a supplier of natural sodium products in northern Botswana.

The existing wellfield was developed in 1985 and comprised 15 boreholes. There are currently four operational boreholes. With an average output of 4.7 MI/day, at an average running duration of 22 hours per day (**Table 15**). The boreholes have an average depth of 100m. The engineering design

recommends future reduction of the pumping hours on the current boreholes and development of five new production boreholes to meet projected demands.

Table 15: Operational Boreholes

Borehole No.	Operational Yield (m ³ /hr)
BH 7675	60
BH 7678	65
BH 7687	45
BH 7647	50
Total	220 m³/hr

As recommended in the NWMPR (2006), the maximum sustainable daily abstraction from the Dukwi Wellfield is 3.9MI/day. The current abstraction of 4.7 MI/day on average, is therefore an unsustainable long-term water supply solution. This abstraction scenario is also likely to result in encroachment of low quality (saline) groundwater and aquifer depletion therefore 5 new boreholes are recommended for development.

2.1.1 Pipelines

Hydraulic Analysis

The hydraulic analyses for the various bulk pipeline legs have been based on the average annual daily demands (AADD's) based on population projections to 2041 and making allowances for seasonal peak, losses in reticulation and conveyance losses. Daily peaks in the reticulation system are deemed to be attenuated by storage provision. The supply areas and demand figures are shown in **Table 16**:

Table 16: Average Annual Daily Demands Based on Population Projection to 2041

	Supply Area	2011 Census Projected to 2020	2041 Projected using an average growth rate of 1.9% per year	Storage based on 48 hours of AADD (m ³) for the 20-year outlook
A.1	Sepako	808	1200	192
A.2	Manxotae	762	1131	181
A.3	Maposa	499	726	116
A.4	Nata	7953	11808	1889
A	Total Dukwi WW to Nata	10012	14865	2378
B.1	Sowa Township	4262	6328	1012
B.2	BotAsh Mine		0	2500
B	Total Dukwi WW to Sowa	4262	6328	3512
C.1	Dukwi Refugee Camp	1000	1000	160
C.2	Dukwi Village	4073	6047	968
C	Total Dukwi WW to Dukwi	5073	7047	1128
D.1	Mosetse (New)	2117	3143	503
D.2	Kutamogoree (New)	2728	4050	648
D	Total Dukwi WW to New Villages	4845	7194	1151
E	Total for Scheme	24192	35435	8170

The overall scheme is designed for an ultimate demand of 6.88MI/d. It has been assumed that the Dukwi Refugee Camp will remain static at 1000 inhabitants.

2.1.2 Pipeline Material Selection

In considering the pipeline materials, the availability, pressure rating, cost, ease of laying, repairing in cases of breakages or leaks and durability of the material was considered. The underground pipeline and above-ground pumping systems have generally been designed to operate at a maximum working pressure of 12 bar. Pipelines will be bedded generally in *in-situ* material, or screened material as required in trenches and be provided with a cover material on top of the pipeline of 1 m depth. In some cases, commercial sources of bedding may be required and should be sourced from licensed suppliers. For the external and internal loading envisaged it is recommended to use UPVC pipes up to 12 bar rating. Whilst HDPE may be more durable, the higher cost and the occasional erratic welding by installers could lead to future problems so these will not be used.

In valve chambers, steel fabricated fittings, lined and coated with 25 micron will be used. Where pipes are cast into partially inaccessible concrete such as under the reservoir foundations, these will be in Grade 314L stainless steel. Pipework inside water retaining structures will be stainless steel. Exposed pipework such as that required for the elevated steel tanks will be hot dipped galvanized steel pipes.

2.1.3 Pipeline Routes

The pipeline routes all start from the Dukwi Waterworks which supplies the rest of the scheme with water as outlined in **Table 17**.

Table 17: Pipelines and Tanks Description

Location	Distance (Km)	Pipe Diameter (mm) and Type
Dukwi Waterworks to Dukwi Village rising main	12.2	250
Dukwi Village to New Dukwi East Elevated Tank rising main	6.8	150
New Dukwi East Elevated Tank to Moseitse West and Moseitse East gravity main	9.8	150
Moseitse East to Kutamogoree rising main	28.2	150
Dukwi Waterworks to Sowa System gravity main	22	250
Dukwi Waterworks to Nata System gravity main	48.4	200
Nata to Manxotae rising main	33.7	150
Manxotae Elevated Tank to Sepako gravity main	27.9	150
Total Pipeline Distance	189	

Table 18: Pump Stations

Pump Stations	Description
Dukwi Waterworks Pump Station	The pump station will be fitted with two pumps (one duty and one standby) to pump into the Dukwi Village Elevated tank via the new 250 mm diameter rising main. The pump duty point is 22.5 l/s x 71 m. A chlorine dosing room is built into the pump station. A sodium hypochlorite solution will be dosed directly into the rising main to Dukwi at a dosing rate of 5 ppm. It will have an operator office, a store and toilet facilities.

Pump Stations	Description
Dukwi Village Pump Station	The pump station will be fitted with two pumps (one duty and one standby) to pump into the new Dukwi East Elevated tank via the new 150 mm diameter rising main. The pump duty point is 10.98 l/s x 41.9 m.
Mosetse East Pump Station	The pump station will be fitted with two pumps (one duty and one standby) to pump into the new Dukwi East Elevated tank via the new 150 mm diameter rising main. The pump duty point is 6.18 l/s x 121.7 m.
Nata Pump Station	The Nata elevated tank pump (one duty and one standby) will pump into the elevated tank via the new 150 mm diameter rising main to the entry into the tank. The pump duty point is 18.37 l/s x 26 m.
Manxotae Pumps	The Manxotae pumps (one duty and one standby) to pump into the proposed new Manxotae elevated tank via the new 50mm diameter rising main. The pump duty point is 4.7 l/s x 58.3 m. A chlorine dosing room is built into the pump station. A sodium hypochlorite solution will be dosed directly into the rising main to Manxotae and the Nata elevated tank at a dosing rate of 5 ppm. The pump station includes an operator office, a store and toilet facilities.

2.1.4 Storage

A storage requirement of 48-hours Annual Average Daily Demand (AADD) (excluding peak factors) is required for the Sowa scheme. As per **Table 19**, a total of 8.17 Ml effective storage is required. **Table 19** presents a summary of existing and proposed storage for the Sowa Water Scheme. The storage is provided in the form of a new 2Ml concrete ground level reservoir at Nata and five elevated tanks of 500 m³ each.

Table 19: Total Storage Required

	Supply Area	Storage required based on 48hours of AADD (m ³) for 20-year outlook (m ³)	Existing Storage (m ³)	Proposed new storage (m ³)	Total storage provided for 20-year outlook (m ³)
A.1	Sepako	192	32	0	32
A.2	Manxotae	181	108	500	500
A.3	Maposa	116	86	0	86
A.4	Nata	1889	195	2500	2500
A	Total Dukwi WW to Nata	2378	421	3000	3118
B.1	Sowa Township	1012	507	0	507
B.2	BotAsh Mine	2500	5000	0	5000
B	Total Dukwi WW to Sowa	3512	5507	0	5507
C.1	Dukwi Refugee Camp	160	32	0	32
C.2	Dukwi Village	968	176	500	500
C.3	Dukwi East (new site at higher elevation)		0	500	500
C	Total Dukwi WW to Dukwi	1128	208	1000	1032
D.1	Mosetse (New)	503	166	0	166

	Supply Area	Storage required based on 48hours of AADD (m ³) for 20-year outlook (m ³)	Existing Storage (m ³)	Proposed new storage (m ³)	Total storage provided for 20-year outlook (m ³)
D.2	Kutamogoree (New)	648	43	500	500
D	Total Dukwi WW to New Villages	1151	209	500	666
E	Total for Scheme	8170	6345	4500	10323

2.1.5 Nata Reservoir

The ground level reservoir is required as balancing storage for Nata, Maposa, Manxotae and Sepako. Sepako has been added to the Nata supply zone. The reservoir has been sized as 2 ML reservoir which will be the main supply to feed the pump station to the elevated Nata tank and the pumps to the planned 500 m³ elevated tank at Manxotae. The proposed is a circular concrete reservoir with dimensions as follows (Table 20):

Table 20: Nata Reservoir Tank Sizing

Ref		Size
1	Internal diameter (m)	22.00
2	Wall thickness (mm)	325
3	Water depth (m)	5.26
4	Overall depth (m)	5.76

There are two disused reservoirs on the existing Nata Reservoir site. Both these tanks will be demolished and removed from site. The site is planned for the pump station (housing the Nata elevated pumps and the Manxotae pumps), the 2 ML ground reservoir and the 500 m³ elevated tank for Nata. A site is also reserved for a future 2 ML ground level reservoir.

2.1.6 Inlet and Outlet Pipework

The inlet and outlet pipework will be housed in a single reinforced concrete chamber. This chamber will also accommodate the overflow pipe from the reservoir and the reservoir scour pipe. The underfloor drainage will also drain into this chamber. The chamber will be provided with a drain pip to daylight in the nearest water course or road drainage system. The pipework will be configured so that the reservoir may be bypassed in case the reservoir is out of service.

The inlet pipework will be fitted with an altitude control valve which is hydraulically piloted to shut when the reservoir reaches top water level and opens when the reservoir drops to 1.5 m. A bypass is provided around the altitude control valve in case the valve needs to be serviced. The pressure sensor to the altitude control valve is provided by a small bore (20 mm) pipe from the reservoir rather than float valves which tend to require more maintenance.

2.1.7 Elevated Tanks

Elevated tanks are required at strategic locations in the scheme to augment storage requirement and to provide elevation to improve supply pressures in the distribution system. Five elevated tanks, each 500 m³ and mounted on a 20 m high stand will be required on the whole scheme. The elevated tanks will be as follows (Table 21):

Table 21: Elevated Tank Design Data

No	Elevated Tank Name	Top Water Level (m)	Approximate Ground Level (m)
1	Kutamogoree	951.5	1084.5
2	Dukwi East	1033.5	1009.0
3	Dukwi Village	1021.5	997.0
4	Nata	938.0	913.5
5	Manxotae	951.5	927.0

Elevated tanks will be galvanized pressed steel tanks built with 1.2 m square panels. The tanks will be fitted with an inlet, outlet, overflow, and scour valve. The inlet control will be via a top entry equilibrium float valve. The inlet and outlet pipes will be on opposite sides of the tank to aid circulation and avoid “dead zones”. Each elevated tank will also be provided with a ground valve chamber which will house a bypass in case the elevated tank is out of service and a flow meter on the outlet pipework. These chambers will not normally be provided with a drain and will require manual pumping in the rare occasion they could collect water from dripping fittings.

2.1.8 Dukwi Reverse Osmosis Water Treatment Plant

Sizing of Water Treatment Plant

BotAsh Mine have confirmed that they require “Boiler Feed” type water for their works, which is effectively the raw water abstracted from Dukwi Wellfield without any treatment. A small amount of water sent to BotAsh will be treated to potable standard in Sowa for the Sowa township, however this will be managed by BotAsh Mine under a separate scheme. The existing Dukwi Water Works to Sowa pipeline will be used to convey “boiler feed” quality (raw water) from Dukwi Water Works to BotAsh.

The remainder of the scheme will be serviced via the RO Plant potable water supply from Dukwi Water Works. The RO treatment works will be located at the Dukwi Waterworks site.

The potable water demand for the entire scheme for current and the 20 year horizon to 2041 is shown in the **Table 22**.

Table 22: Potable Water Demand for 20 Year Horizon

	Supply Area	2021 Demand incl seasonal peak and conveyance loss ML/day) for POTABLE WATER	2041 Demand incl seasonal peak and conveyance loss ML/day) for POTABLE WATER
A.1	Sepako	0.11	0.16
A.2	Manxotai	0.10	0.15
A.3	Maposa	0.07	0.10
A.4	Nata	1.07	1.59
A	TOTAL DUKWI WW TO NATA	1.35	2.00
B.1	Sowa Township	0.57	0.85
B.2	BotAsh Mine		
B	TOTAL DUKWI WW TO SOWA	0.57	0.85
C.1	Dukwi Refugee	0.13	0.13
C.2	Dukwi Village	0.55	0.81
C	TOTAL DUKWI WW TO DUKWI	0.68	0.95
D.1	Mosetse (new)	0.28	0.42
D.2	Kutamogoree (new)	0.37	0.54
D	TOTAL DUKWI WW TO NEW VILLAGES	0.65	0.97
E	TOTAL POTABLE WATER FOR SCHEME	3.25	4.76

	Supply Area	2021 Demand incl seasonal peak and conveyance loss ML/day) for POTABLE WATER	2041 Demand incl seasonal peak and conveyance loss ML/day) for POTABLE WATER
	BotAsh Mine	1.20	8.32
	Total Water Demand (incl losses)	4.45	13.09

WUC has adopted a policy of providing potable water quality standard for current demands in the first phase development of the scheme, whilst at the same time planning for future expansions of the scheme. As such the Dukwi RO plant will be sized initially for 3.25ML/d. Standby capacity of 50% will be provided. The initial demand (and future demands) will be provided in modules of 80m³/h which provides additional flexibility on operations and down time of individual modules for maintenance etc. The proposed modular approach is shown in **Table 23**.

Table 23: Reverse Osmosis Plant Demands (excl. BotAsh)

RO PLANT EXCL BOTASH (As BotAsh do not need potable water)					
	Water Demand ML/d	Water Demand m ³ /h in 16 hours	No. of 80m ³ /h Modules with 50% Standby	Rounded off no of 80m ³ /h Modules	
2021	3.25	203.21	3.81	4x80m ³ /h=	3 plus 1 standby
2041	4.76	297.65	5.58	6X 80m ³ /h=	4 plus 1 standby

In summary, initially the RO water treatment plant with capacity of 240m³/h plus standby of 80m³/h will be provided, with the site layout planned for an additional 160m³/h to be provided in future.

Water Quality

WQ Compulsory compliance

The plant shall be capable of delivering the specified quantity and BOS32:2015 and WUC Internal Water Quality Specification water quality, in conjunction, of treated water from feed water of the approximate analysis. Notwithstanding the provided analysis, the Consultant is proceeding with undertaking of supplementary water quality analysis of the Dukwi borehole source to provide a more comprehensive water profile and ensure compliance with regulatory limits.

Water Temperature

The plant shall be capable of delivering the specified quantity and quality of treated water from feed water of temperature in the range 20 to 30°C. The most conservative of the upper or lower temperature limits shall be taken as required to determine the allowable recovery, the achievable salt rejection, the required feed pressure, the design of the pre-treatment and post-treatment, the selection of membranes, pumps and all other plant components.

Membrane Fouling

The plant shall have the capacity to deliver the specified treated water discharge under conditions in which the required reverse osmosis feed pressure is 15% higher than that required on commissioning.

Membrane Age

The targets for treated water quality shall be met for the whole service lifetime of the membranes. The method used for verification will be set out in the tests on completion. The plant will produce

approx. 3.5ML/d treated water in Phase 1, with capacity for augmentation in Phase 2 to a capacity of 6.4 ML/d. The proposed water treatment plant will utilize a two-stage reverse osmosis (RO) process for desalination of the borehole water. The key treatment processes are:

1. Pre-Filtration,
2. Reverse Osmosis,
3. Post- treatment,
4. Disinfection and
5. Evaporation of Reject Brine.

The turbidity levels, which are still pending from supplementary water quality testing regime, will confirm the need for additional pre-treatment.

Conceptual design for four modules of 80 m³/h (3 modules in operation + one in stand-by), plus another two modules in the future, in a 2 stage RO process has been carried out.

Water Treatment Components

The main RO Water Treatment Plant (WTP) components are:

1. Raw water pumps
2. Pre-chlorination
3. Pre-treatment filters
4. Additives' dosing system
5. Reverse Osmosis
6. Post-treatment
7. Chemical dosing
8. Disinfection (Contact) tank, 1000m³

The following subsections present the specifications for these components.

Table 24: Raw Water Tanks and Pumps

Description	Details
Raw Water Tank	
Quantity	1 No. (one)
Size	Half of the proposed 1000 m ³ reservoir to be used for raw water feed tank with the other half used as balancing storage for the Sowa supply.
Material of Construction	Concrete with protection for the one half used as raw water feeder tank for RO Plant
Internal lining	N/A
Inlets	Top entry
Construction type	Ground tank (existing)
Raw Water Pumps	
Quantity	3 No. (2 duty, 1 standby plus 1 future)
Flow	80 m ³ /hr
Head	To be determined by contractor
Material of Construction	CI/SS (Stainless steel impellers and shafts, cast iron casing)
Type	Horizontal

Pre-Chlorination

Pre-chlorination is to be provided in the Raw Water Tanks to prevent biological fouling; as seen from the raw water quality assessment, regardless of the source being a groundwater, microbial population were reported (fecal and total coliforms). This population may rapidly multiply on the subsequent membranes, especially when out of service. Pre-chlorination is also to be provided for oxidation of iron, manganese that can precipitate on the membrane, for their subsequent removal in the multigrade filter.

Pre-treatment Filters

The borehole water, as a minimum, will be subjected to multimedia filtration for removal of all suspended material, organics and chlorine that may foul or otherwise degrade RO membranes. The total organic carbon (TOC) and turbidity levels which are still pending, will further inform whether coagulation/ flocculation is needed.

The flow velocity of the pre-filter should be calculated to achieve a silt density index (SDI) of not more than 3 - 4 for a longer membrane life.

Chemical additives

Additives will be dosed into the feed water to maximize efficiency of water production and improve the service cycle of the RO membrane by reducing precipitation of metallic compounds and scales. The proposed additives will include:

- Acid: hydrochloric or sulphuric acid to maintain salts in solution for reduced precipitation on the membrane, which increases the period before membrane cleaning.
- Anti-scalant solution to inhibit scale from calcium carbonate and sulfates precipitates while also dispersing colloidal particles and metal oxides.
- Sodium bisulfite/ metabisulfite or other for chlorine removal.

The additives facilities shall meet the following specifications:

Description	Details
Anti-scalant Dosing System	
Units	3 in duty plus 1 in standby
Flow rate	105 m ³ /hr
Dosing concentration volumetric dosing rate	5 ppm
Monthly consumption	Approx. 300 kg
Chlorine Removal Dosing System	
Units	3 in duty plus 1 in standby
pH Dosing System	
Units	3 in duty plus 1 in standby

The pre-chlorination and addition of chemical additives to the raw water must consider the configuration of associated tanks and plant to allow for both:

- continuous supply of potable water to the network, and
- that the final works layout must account for raw water supply to Sowa without any pre-chlorination or chemical additives.

High Pressure Pumps for RO Modules

Description	Details
High Pressure Pumps	
Quantity: 1 st Stage 2 nd Stage	3 No. (2 duty, 1 standby plus 1 future duty) 1 No. (1 duty plus 1 future duty)
Flow rate: 1 st Stage 2 nd Stage	240 m ³ /hr 80 m ³ /hr
Discharge pressure	14.0 kg/cm ²
Material of construction	Cast iron and stainless steel
Type	Vertical inline pump/plunger; because of the wide TDS range and Variable Frequency Drive (VFD) should be considered but also taking into consideration stability of the power supply
Pressure Gauge	
Quantity	2 Set
Range	0 to 18 kg/cm ² , Connection: 1/2" Metric National Pipe Tapered, Bottom entry, 2.5" dial.

Reverse Osmosis Modules and Configuration

The Reverse Osmosis (RO) treatment shall entail a two-stage process with a minimum recovery of 75% for the 1st Stage and 50% for the 2nd stage. Therefore, the target recovery is 87.5%.

The Contractor shall provide two duty and one standby RO modules for the 1st stage and one duty treatment unit for the 2nd Stage for Phase 1 (**Table 25**). The common manifolds and other pipework and electrical works shall be selected and designed that the system can be extended in the future to accommodate one additional duty in the 1st stage and one duty in the 2nd stage treatment for Phase 2 without the need to replace pipes or cables installed under this Contract.

Table 25: Reverse Osmosis Modules and Configuration

Description	Details
RO Module	
Quantity: 1 st Stage 2 nd Stage	2 modules in duty, 1 in standby (Phase 2: plus 1 duty) 1 module in duty (Phase 2: plus 1 duty)
Flow rate:	92 m ³ /h
Feed pressure	Approx. 150 PSI
Permeate outflow	80m ³ /hr
Design Permeate/Feed Ratio (%): 1 st Stage 2 nd Stage	75% 50%
Membrane type	Poly Amide Spirally Wounded membrane
Design flux	<31 litre/hour/m ²
Size of pressure tubes	-
Material of construction	Fibre Reinforced Polymer
End plate	Fibre Reinforced Polymer
Pressure rating	300 PSI
Suck-back tank	Capacity to fill piping and membranes

Post-treatment Stabilization

The treated water shall be stabilized to reduce corrosiveness by passing the water through a calcite column to raise pH to the 8-8.5 range and increase calcium and bicarbonate concentrations. The calcium carbonate precipitation potential (CCPP) shall be controllable, and the treated water shall be within the range +1.0 to +5.0mg/l, taken as the equivalent CCPP at an ambient temperature of 25°C, but restricting TDS to less than 500 ppm.

Reject Brine Neutralization

Reject brine has an acidic pH, which is required to be neutralized to avoid damage to the evaporation ponds lining materials. The brine will be neutralised by addition of caustic soda.

Disinfection

Disinfection of the treated water will be carried out in the Contact Tank by automated dosing of chlorine dioxide. A chlorine dosage of 0.85 mg/L – 1.0 mg/L Cl will be injected to produce a residual of 0.3 – 0.4 mg/L at consumer points. The chlorine dioxide will be stored in a chlorine room outside the main treatment building.

The design system will be integrated with inline chlorine residual analysers and the water treatment process Control System. This is to be monitored using the RO plant SCADA system, over and above the chlorine dosing system within the pump station.

Injector/diffuser

The chlorine solution injector/diffuser must be compatible with the point of application to provide a rapid and thorough mix with all the water being treated. The centre of a pipeline is the preferred application point.

Testing Equipment

- a. Chlorine residual test equipment recognized in the latest edition of Standard Methods for the Examination of Water and Wastewater shall be provided and should be capable of measuring residuals to the nearest 0.01 mg/L in the range below 1.0 mg/L, to the nearest 0.1 mg/L between 1.0 mg/L and 2.5 mg/L and to the nearest 0.2 mg/L above 2.5 mg/L. It is recommended that all systems, as a minimum, use an instrument with a digital readout.
- b. Automatic chlorine residual recorders should be provided where the chlorine demand varies appreciably over a short period of time.
- c. All treatment plants having a capacity of 1.9 ML/day or greater should be equipped with recording chlorine analysers monitoring water entering the distribution system.
- d. The system shall be provided with equipment to measure chlorine residuals continuously entering the distribution system.
- e. Systems that rely on chlorination for inactivation of bacteria or other microorganisms present in the source water shall have continuous chlorine residual analysers and other equipment that automatically shut down the facility when chlorine residuals are not met unless otherwise approved by the reviewing authority.
- f. All continuously recording chlorine residual analysers must be compatible with the requirements of EPA Method 334.0.

Tests on Completion

Treated Water Discharge

During tests on completion, the Contractor shall demonstrate that each of the three reverse osmosis units has the capacity to deliver a treated water discharge of 240 m³/h after stabilization and any other post-treatment. The Contractor shall further demonstrate that the pumps are capable of delivering the same discharges at a reverse osmosis feed pressure 15% higher than that prevailing during commissioning at the time when the water samples are taken for quality testing.

Treated Water Quality

Water quality tests shall be carried out during the tests on completion, at the mid-point of the Defects Liability Period and shall comprise three sub-samples taken from the following points:

1. Raw feed water from the plant inlet.
2. Product water taken at a point before the blending of raw water or other stabilization measure.
3. Final treated water after stabilization.

At the time of sampling, the feed, product and (if applicable) blending water discharges shall be recorded, as well as the conductivity and pH at the time of sampling. The samples shall all be analyzed for all the detailed parameters.

Operational considerations

The Dukwi wellfield is currently the only source of raw water to the Scheme. The sustainability of the source is to be verified by further studies including the study commissioned by BotAsh for the Dukwi wellfield, which results, and findings are expected during 2022. The latest information to hand is the conclusions drawn from the WUC September 2021 report which states that the Dukwi wellfield could supply 6.85 MI/d with a reduction of the pumping hours on the current boreholes and development of five new production boreholes.

Assuming a recovery rate of 80%, the water requirements from Dukwi Wellfield is as follows (**Table 26**):

Table 26: Dukwi Wellfield Supply Required

	Inflow from Dukwi Wellfield Assuming 20% Treatment Losses	Add Inflow for BotAsh Mine	Total Required from Dukwi Wellfield MI/d
2021	4.06	1.20	5.26
2041	5.95	8.32	14.28
2041 (BotAsh demand remains same)	5.95	1.20	7.15

Table 25 shows that the Dukwi wellfield (with an assumed capacity of 6.85MI/d) could easily supply the 2021 demand of 5.26MI/d and will fall 4% short of the 2041 demand of 7.15MI/d, with no increase in the BotAsh demand.

In liaison with BotAsh Mine, it was determined that the BotAsh Mine (and Sowa township) shall be supplied with raw water (i.e. “boiler feed”) water direct from the boreholes. The large percentage of water that BotAsh mine uses as feed water is of raw water quality. The remaining portion to be treated to potable standard for Sowa township, will be treated in Sowa under a separate arrangement. The Dukwi Water Works therefore needs to supply a stream of raw water to Sowa.

The water being treated to potable standard at the Dukwi Water Works will be pre-treated in a separate stream with pre-chlorination, screening and chemical additives to increase its alkalinity prior to entering the Reverse Osmosis system, as this will improve the treatment performance. This pre-treated water is corrosive in nature and must be stored in an adequately protected tank. It is not suitable for pumping to Sowa.

Following completion of the reverse osmosis process, the water is then considered ‘clear water’ and is ready for supply. As such, there are three separate water quality streams that need to be adequately contained and processed throughout the works:

- “Boiler Feed” quality, i.e. raw water from the Dukwi Wellfield, which is the suitable feed water for BotAsh mine.
- “Pre-treated feed” this water has been pre-chlorinated, screened and pre-treated with chemical additives, ahead of the RO process, as detailed under water quality. It must be noted that the “pre-treated feed” water is not suitable as feed water to the BotAsh mine, due to its corrosive nature.
- “Clear water”; this water has been through the RO process and is ready for distribution to the network.

A new 1 ML reservoir will be constructed at Dukwi Water Works. As the existing 500 m³ west tank will be utilized (refurbished) to hold clear/potable water, the 1 ML tank will be utilized to hold both the pre-treated RO feed, and the raw water supply to Sowa, housed in two separate 500 m³ compartments within the 1 ML circular tank.

This 1 ML tank will be constructed on the site of the existing easternmost 500 m³ rectangular ground water tank which will be taken out of service and removed. The other 500m³ ground tank (west tank) which is recently refurbished by WUC will remain in place and be the clear water supply for the scheme. The 1 ML reservoir will be provided with a central division wall to supply both the RO water treatment plant, and the BotAsh Mine / Sowa township pumped supply (“boiler feed” quality water). This is equivalent to 2.3 hours storage which implies that the borehole pumps must be operational whilst the RO plant is working simultaneously with the supply of boiler feed quality water to Sowa.

The 500 m³ clear water tank provides 3.7 hours balancing storage for the gravity and pumped supply to Nata and Dukwi zones.

Brine Disposal Facilities

Overview

The Botswana Integrated Water Resources Management and Water Efficiency Plan (2013), which provides guidelines for managing liquid waste, states that the fundamental requirement for managing liquid waste was to minimise environmental impacts, and the two main considerations are:

- Quantity of liquid waste generated

- Site conditions where the liquid waste management facility is to be constructed and effluent discharged underground or into receiving water bodies.

Loading from RO Water Treatment Plant

The volume of brine (reject water) from the proposed Dukwi RO water treatment plant for the initial and ultimate capacities, based on the specified recovery rate of 80%, is shown in **Table 27**. The quantity of liquid waste is greater than guideline threshold of 200m³/d, thereby being in the category of a “large” liquid generation rate.

Table 27: Brine (Reject Water) from Dukwi RO Treatment Facilities

Year	RO Plant Permeate (Demand)	Brine (Reject Water)
2021 (Initial capacity)	3.25 MI/d	0.81 MI/d (20% of 4.06 MI/d)
2041 (Ultimate capacity)	4.76 MI/d	1.19 MI/d (20% of 5.95 MI/d)

Method of Brine Disposal

Due to the inland locality of the proposed Dukwi RO water treatment plant and favourable climatic conditions, lined brine evaporation ponds were selected as the preferred method of brine disposal. The brine will be delivered under gravity from the RO treatment plant to the evaporation ponds using a pipeline.

The brine, despite not being hazardous, will have a high salinity, so to prevent intrusion into the surrounding environment, the brine will only be disposed of through evaporation. Furthermore, the additional benefit of evaporation ponds is low reliance on electricity, making it more reliable in case of power outage.

The site selected for the brine evaporation pond facility is classified as “non-wetlands” and the level of threat of the brine on non-wetland is moderate risk due to resilience of land systems. The risk classification of the liquid waste management facility according to the Botswana Integrated Water Resources Management & Water Efficiency Plan (2013) is “Medium”. This classification of medium risk is due to volume of brine generated and not due to the chemical composition of the liquid.

Brine Evaporation Pond Design

Water Surface Area

For the purpose of sizing the brine evaporation ponds, average monthly precipitation and freshwater evaporation rates measured between 2003 to 2014 were obtained from BotAsh. This data was considered suitable to use for the brine evaporation pond sizing as BotAsh is within reasonable proximity to the Dukwi waterworks and the period over which the data was measured is sufficient for accurate averages.

For both the initial (0.81 MI/d of brine in 2021) and ultimate capacities (1.19 MI/d of brine in 2041), a simplified water balance assessment was produced for the system (shown in **Table 28**) to account for (i) the brine entering the evaporation ponds from the proposed Dukwi RO water treatment plant; and (ii) the net evaporation released to the atmosphere (i.e. the difference between the measured monthly evaporation and precipitation). The required water surface area for the brine evaporation ponds, based on factored monthly averages, was 20Ha for the initial capacity and 29 Ha for the ultimate capacity. A safety factor of 1.3 was applied to account for the influence of the brine salinity

on evaporation rates. A concept sketch of the proposed brine evaporation ponds is included under Annex 15.

Table 28: Brine Evaporation Pond Water Surface Area Sizing

Month	Average Monthly Precipitation Source: BotAsh 2003-2014 (mm)	Average Monthly Evaporation Source: BotAsh 2003-2014 (mm)	Net Average Monthly Evaporation (mm/month)	Pond Water Surface Area Required for 0.81 MI/d of Brine (2021) (Ha)	Pond Water Surface Area Required for 1.19 MI/d of Brine (2041) (Ha)
Jan	127	230	103	24	35
Feb	74	221	147	17	24
Mar	49	195	146	17	24
Apr	30	197	167	15	21
May	3	171	168	15	21
Jun	15	140	125	20	29
Jul	0	145	145	17	25
Aug	0	184	184	13	19
Sep	3	259	256	10	14
Oct	15	305	290	8	12
Nov	82	273	191	13	19
Dec	102	255	153	16	23
Average	42	215	173	15	22
Safety Factor				1.3	1.3
Total Water Surface area required				20 Ha	29 Ha

Evaporation Pond Depth

The proposed nominal pond basin level is 952.500 m with a proposed maximum operating water level (MOWL) of 953.200 m and a spillway invert level of 953.350. Thus, the total height proposed for the internal pond embankment walls (i.e. from pond basin to crest of embankment wall) is 1.0m. This allows for a depth of 0.7 m for storage of brine during the winter months when evaporation is low; a 0.15 m design storage allowance for wave action due to wind and to provide storage up to the 1:50-year rainfall event; and a further 0.15 m to provide spillway capacity up to the 1:100-year rainfall event.

Pond Embankment Walls

The pond embankment walls will be constructed using homogeneous earth-fill with a slope of 1V:2H.

Liner System

To prevent contamination of the underlying soil and groundwater, the brine evaporation ponds will be a fully contained system. The internal faces of the ponds will be completely lined by a HDPE liner system complete with protective geotextiles.

The subgrade earthworks will entail preparation of a smooth surface, free from loose angular particles and vegetative matter, compacted to 95% Mod AASHTO density. On completion of the subgrade works, a non-woven needle punched geotextile will be laid to serve as a lower protection measure. A

1.5mm smooth HDPE geo-membrane liner will be installed as the primary liner and finally overlaid by another layer of non-woven needled punched geotextile as an upper protection measure.

The liner system will be anchored at the pond embankment anchor crests using 300mm wide by 600 mm deep earth-fill anchor trenches.

Inlet Details

Brine from the proposed Dukwi RO facility shall be conveyed under gravity to the brine evaporation ponds using a 2140 m long 450 mm diameter uPVC pipeline, running along the alignment of the existing overhead powerline servitude, that will feed into a concrete inlet structure. The inlet structure will contain penstock gates to enable the closure of flow for maintenance.

Ancillary Details

The following ancillary items have been included as part of the brine pond evaporation facility: Vehicular access will be provided off the A3 road and existing overhead powerline servitude road.

- Grassed stormwater cut-off drains will be provided along the outer toe of the embankment walls.
- Steel palisade fencing will be provided around the perimeter of the brine pond evaporation facility along with elephant deterrent features in the form of spiked slabs.

Ancillary Facilities for RO Water Treatment Plant

The 4x80 m³/hour modular units for the RO treatment shall be housed in a steel shed with a reinforced concrete floor slab. The layout includes for adequate working space between RO units.

Power supply

The power supply requirement for the feed and high-pressure pumps will ultimately depend on the propriety equipment offered by the suppliers under the proposed design build contract. In our performance specifications, we will indicate a preference for a total power requirement of less than 2 kwh/m³. For the power supply to the site we will make an allowance for 4 x 80 m³/hour modules requiring 2 kwh/m³ in addition to the other power supply requirements for the Dukwi pump station.

SCADA Requirements

The RO treatment plant building will be equipped with a 1500A distribution board supplied by others. This board will be equipped with 300A TP MCCBs for each RO treatment stream. The RO plant contractor will be responsible for all cabling between this board and the RO treatment streams including the connections to the distribution board. All small power and lighting within the RO treatment building will be undertaken by others.

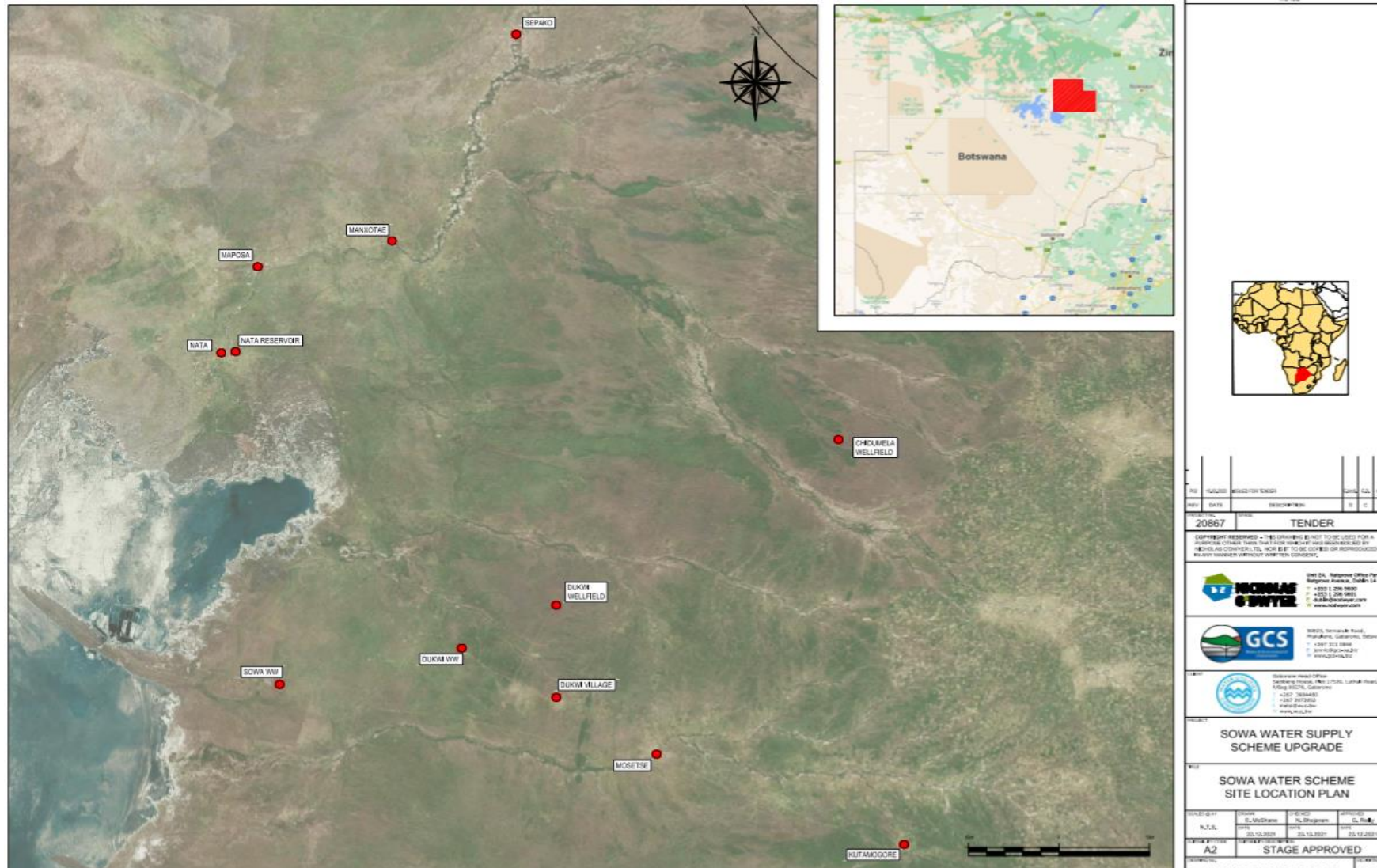
Site investigation requirements for RO treatment plant, brine evaporation ponds and associated works

The development of detailed designs for the brine evaporation ponds and associated works will require a topographic survey and geotechnical investigations of the extent of works. Geotechnical investigations are envisaged to consist of, but not limited to, test pits, DCP tests and seepage tests.

2.2 Project Components

The key components of the proposed Sowa Water Supply Scheme are as follows:

- Design and construction of the pipelines (uPVC pipes and diameters of 250mm, 200mm and 150mm) including:
 - Dukwi Waterworks to Dukwi village with a take-off to Dukwi Refugee Camp
 - Dukwi village to Moseitse East
 - Moseitse East to Kutamogoree
 - Dukwi Waterworks to Nata Waterworks
 - Nata Waterworks to Manxotae with a take-off to Maposa
 - Manxotae to Sepako
 - Dukwi Waterworks to Sowa Waterworks
- Design and construction of pump stations, reservoirs and elevated tanks (all 500 m³) including:
 - New elevated tank at Kutamogoree
 - New pump station at Moseitse East
 - New elevated tank at Dukwi East
 - New elevated tank at Dukwi Village
 - New pump station at Dukwi Waterworks
 - New ground level tank at Nata Waterworks
 - New elevated tank at Nata Waterworks
 - New pump station at Nata Waterworks
 - New control valve chamber to Maposa elevated tank
 - New elevated tank at Manxotae
- Design of the SCADA and telemetry system to link in with the existing system at Dukwi Water Works and wellfield. The following items will be monitored:
 - Flow rate, instantaneous and cumulative;
 - Pump delivery pressure;
 - Pump status, on/off;
 - Motor condition, current drawn, and
 - Water level in borehole
- Design and construction of Reverse Osmosis (RO) water treatment plant.
 - Brine disposal ponds
 - Associated civil works for installation of the modular RO units
 - Pipeline between the RO plant and the brine disposal ponds
 - Modular RO plant



Map 3: Beneficiary Villages and Wellfields

2.3 Project Activities

A list of project activities that will be undertaken for various phases of the sub-project are shown in **Table 29**.

Table 29: Anticipated Project Activities

Pre-Construction	Construction	Decommissioning After Construction	Operation and Maintenance	Decommissioning
<ul style="list-style-type: none"> • Preparation of detailed design • Preparation of ESIA and ESMP, Resettlement and VCP Reports • Obtaining of any permits/permissions/licences/approvals required eg land clearing • Land acquisition • Tendering and award of Contract for a Contractor • Application for wayleave for using road servitude • Finalisation of all resettlement or compensation issues • Employment of workers • Employment of Community Liaison Officers (CLOs) • Identification of a location for a Contractor's office. • Implementation of safety and health measures, including codes of conduct related to GBV, SEA, SH and VAC and child labor • Acquisition of materials and equipment so that environmental, health and 	<ul style="list-style-type: none"> • Land clearing for servitudes, contractor's camps and labourer's camps • Excavation and filling up of trenches • Laying of pipes • Building ancillary infrastructure • Decommissioning of old tanks (two disused Nata Reservoir tanks) and pipes • Transportation of various project materials • Putting up telemetry • Disinfection of pipes • Haulage of materials and equipment (sand, pipes, machinery, etc.) • Transportation of workers • Fencing of site with palisade fencing for storage tanks and pump stations • Community consultations including VC • Implementation of safety and health measures, including Codes of Conduct (CoC) related to GBV, SEA, SH and VAC and child labor 	<ul style="list-style-type: none"> • Dismantling of temporary installations, Contractor's camps (including office) and labourer's camps • Cleaning up and removal from site all waste materials • Transportation of all unused materials and plant away from site • Transport of all recyclable and reusable materials away from site • Community consultation including VCs • Monitoring of Grievance Mechanism • Implementation of Safety and Health measures, including codes of CoC related to GBV, SEA, SH and VAC and child labor • Rehabilitation of site, as well as the Contractor's camps and labourer's camps, to their near-original state. 	<ul style="list-style-type: none"> • Ensuring adequate water pressure • Ensuring good water quality • Maintenance of system and attending to problems such as pipe bursts, leakages etc. • Community consultation including VC • Implementation of safety and health measures, including CoC related to GBV, SEA, SH and VAC and child labor • Implementation of emergency preparedness measures for the early identification of risks (e.g. fire, social unrest etc) and effective mitigation of measures in the event of an emergency • Monitoring of GM • Monitoring of the sub-project site 	<ul style="list-style-type: none"> • Decommissioning of all storage tanks, reservoir tank and pipes • Decommissioning of reverse osmosis (RO) plant through dismantling various components • Dismantling of temporary installations, Contractor's camps (including office) and labourer's camps • Cleaning up and removal from site all waste materials • Transportation of all unused materials and plant away from site • Transport of all recyclable and reusable materials away from site • Community consultation including VCs • Monitoring of Grievance Mechanism • Implementation of Safety and Health measures, including codes of CoC related to GBV, SEA, SH and VAC and child labor • Rehabilitation of sites, as well as

Pre-Construction	Construction	Decommissioning After Construction	Operation and Maintenance	Decommissioning
<p>safety measures can be implemented</p> <ul style="list-style-type: none"> • Community consultation including VCs • Monitoring and socialization of Grievance Mechanism (GM) 	<ul style="list-style-type: none"> • Implementation of emergency preparedness measures for the early identification of risks (e.g. fire, social unrest etc) and effective mitigation of measures in the event of an emergency • Monitoring of GM • Monitoring of sub-project site for social and environmental risks and alignment with mitigation measures 			<p>the Contractor's camps and labourer's camps, to their near-original state.</p>

2.4 Area of Influence and Associated Facilities

2.4.1 Contractor's Campsite Selection

The implementation of the sub-project will require the establishment of two contractor's camps and two labourer's camps. The locations for the camps are still to be decided but will be located 10km or away from the vulnerable community villages and the Dukwi Refugee Camp. They will comprise structures to allow the 20 to 40 personnel (peak) (**Figure 3**) to undertake the Works as follows:

- Water supply and electricity power connections
- Ablution facilities (conservancy tank)
- Accommodation for engineer, supervisor, equipment operators, OHS officer and drivers (approximately 10 to 20 persons)
- Offices, workshop, and storage sheds
- Plant, tools and equipment.

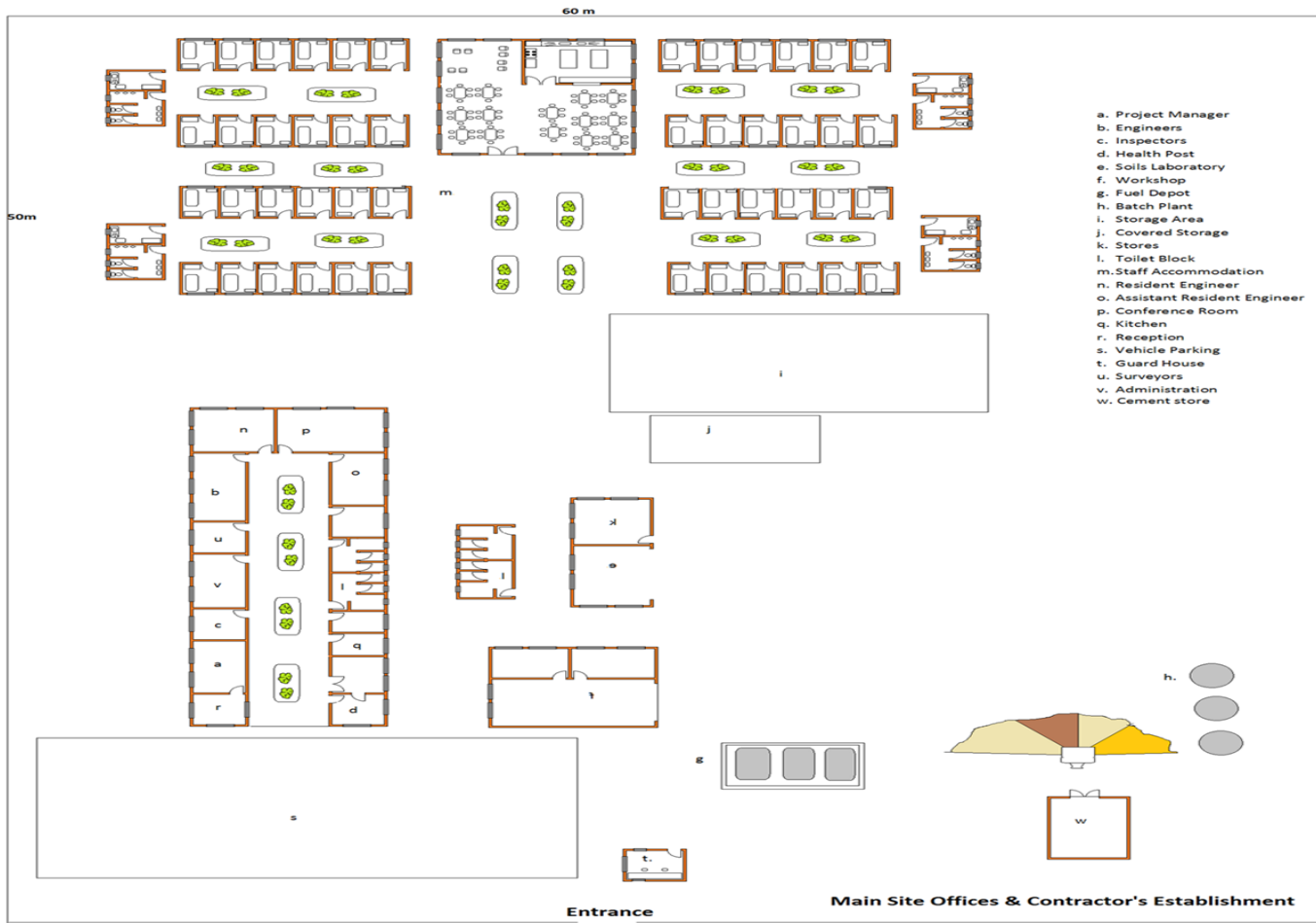


Figure 3: Typical Contractor's Camp Layout

The following are criteria to be considered when selecting the camp site:

- No contractor's camp should be cited within a radius of 500 m of any sensitive receptor (e.g., schools, clinics, built up residential area) to mitigate social risks, and within a 1 km radius of a protected area and at least 200 m from any surface water course. The camp will also be not within 1 km of a community sacred site or of use to the community for their livelihoods.
- The site should be adequately drained, and slope should be between 3 - 7 percent.
- Limit clearing strictly to the allocated size of the camp.
- Cleared vegetation should be heaped away from the road so as not to interfere with traffic.
- The movement of construction vehicles should be restricted to the designated access routes.

2.4.2 Waste Generation and Management

The types of waste likely to be generated during the various phases of implementation of the sub-project and how they are to be managed are shown in **Table 30** below.

Table 30: Waste Streams and Types Generated and their Disposal Methods

Waste Stream	Waste Type	Project Phase	Storage Facility	Waste Disposal Method
Vegetation	G	C	Stockpile <i>in situ</i>	Collection by the local community for use as firewood, building materials, edible plants, thatching etc. Use of vegetation as mulch by the contractor for rehabilitation
Waste paper (office) and cardboard	G	P, C, D, OM	Black plastic dustbin/drums/ plastic bags (labelled and with secure lids)	Collection by a recycling company and transported to the recycling facility or transportation by the contractor to a recycling facility
Glass bottles	G	P, C, D, OM	Blue drums (labelled and with secure lids)	Collection by a recycling company and transported to a recycling facility or transportation by the contractor to a recycling facility
Aluminium (beverage and other) cans	G	P, C, D, OM	Green drums (labelled and with secure lids)	Collection by a recycling company and transportation to the recycling facility or transportation by the contractor to a recycling facility
Pipes	Sp: H	C, D	Under a shed at the contractor's camp site	Use of usable pipe lengths by WUC / Disposal of sections of pipe that are not fit for use at a landfill site
Soil/Spoil	I	C	Stockpile <i>in situ</i> and separate the 'topsoil' from other soil	Collection by local people for building /Use by the contractor for borrow pit rehabilitation
Rock (calcrete) blasting	I	C	<i>In situ</i>	Collection by local community for use as building material/ Use by the contractor for borrow pit rehabilitation
Contaminated soil	Sp:H	C	Stored in sealed bags or containers within a covered, bunded area at the contractor's camp	Pre-treatment before disposal into the environment or disposal at a landfill site that can receive hazardous waste

Waste Stream	Waste Type	Project Phase	Storage Facility	Waste Disposal Method
Rubble	G	C	<i>In situ</i>	Use by the contractor for borrow pit rehabilitation (if considered not damaging to the receiving environment) Disposal at a landfill site
Wooden planks or other pieces of wood	G	C, D	Camp	Re-use by the contractor or WUC/ Collection by the local community for re-use as building materials
Discharge water after cleaning/ disinfection of pipes	G	C	-	Free drain water into the environment ('moon lighting') with all precautionary measures not to cause erosion. Disposal should not be into private property or sensitive natural or archaeological environments
Tyres	G	C	Designated area within the contractor's camp site	Collection by community for re-use/ Land fill
Human excreta	Sp: W	P, C, OM, D	Portable toilet/conservancy tank	Collection by a specialist waste contractor for disposal at the Wastewater Treatment Works (WWTW) in Sowa Town
Waste oil	Sp:H	C, D	Used oil drums /tank- the area must be bunded	Collection by a specialist waste contractor and transported to a recycling facility or recycling company
Waste grease	Sp:H	C, D	Used grease drums	Collection by a specialist waste contractor and transportation to recycling
Batteries	Sp:H	C, D	Cage, within a bunded area in the workshop at the contractor's camp	Collection by a specialist recycling contractor
Scrap materials, wires, tanks	G	C, D	Designated place in the store at the contractor's camp	Collection by scrap metal dealers for recycling

Key: Type of Waste: I- Inert; G-General Waste; Sp: H-Special: Hazardous Waste; Sp: W-Special: Wet Waste
Phase of Project: P- Pre-Construction; C- Construction; OM- Operation and Maintenance; D-Decommissioning

2.4.3 Access Roads

The main sub-project access road is the 86 km A3 tarred road from Kutamogoree to Maposa turn-off after Nata village. The other access road is a 51 km tarred road from Nata-Maposa turn-off to Sepako village. A 24.2 km tarred road is used to access Sowa Town from the main A3 road. A 12 km dirt road is used to access the furthest borehole at Dukwi Wellfield from the Dukwi Waterworks (**Table 31**). The access road to the boreholes is impassible during the rainy season due to black cotton soils and therefore repair works are impossible during this period.

Table 31: Sub-Project Access Roads and Components

Access Roads	Sub-Project Components
12.2 km A3 tarred road connecting Dukwi Waterworks to Dukwi Village	Replace the existing rising main with a new 200 mm diameter rising main
6.8 km connecting Dukwi Village to New Dukwi East Elevated Tank	150 mm diameter rising main pipeline
9.8 km tarred road connecting New Dukwi East Elevated Tank to Moseitse West and Moseitse East	150 mm diameter gravity main pipeline

Access Roads	Sub-Project Components
28.2 km tarred road connecting Moseitse East to Kutamogoree	150 mm diameter rising main pipeline
22 km tarred road connecting Dukwi Waterworks to Sowa System	350 mm diameter gravity main pipeline
48.4 km tarred road connecting Dukwi Waterworks to Nata System	200 mm diameter gravity main pipeline
33.7 km tarred road connecting Nata to Manxotae	150 mm diameter rising main pipeline
27.9 km tarred road connecting Manxotae Elevated Tank to Sepako	150 mm diameter gravity main pipeline

2.4.4 Water Source Quality

Generally, the Dukwi Wellfield boreholes and the surroundings have good water quality except that the water chemistry shows elevated major ions in some boreholes.

- Sodium (Na) recorded as high as between 211-580 mg/L, calcium 106-155 mg/L and chloride 262-654 mg/L.
- Total Dissolved Solids (TDS) was observed to range within marginal to brackish water, with figures going between 600 to 1,890 mg/L except the extreme record of 36,154 mg/L at BH7487.
- Notable records of iron ranging between 0.69 to 4.90 mg/L and these mostly were picked from monitoring boreholes (BH7546, BH7639, BH7641, BH7642 & BH7671) the reason being that monitoring boreholes are not being pumped hence tend to stand for a long time within steel casing bore consequently forming some rust.

Water quality is central to the sub-project. Contamination of the water to be supplied may result from rusty reservoirs, residual old chemicals and worn-out water transfer equipment. In some cases, there may be residual salts within the pipelines.

Stringent water quality issues, specifically bacteriological quality, will be considered in accordance with the World Health Organization (WHO) published "Guidelines for International Standards of Drinking Water" (GISDW) in 1984 and the BOS 32:2015 Drinking Water Specification.

Consideration will be given to potential corrosion by aggressive water which may cause a deterioration in the quality of the water infrastructure and lead to its damage, as well as increase operations and maintenance cost due to the need for more frequent replacements.

2.4.5 Land Requirements for the Sub-Project

Resettlement

There will be no acquisition of private property, public lands are free of encumbrances (i.e., no squatters and encroachers), and the pipes will go through the roads reserve. If some encroachments are realized, the necessary consultations will be done with the project affected persons and they will be duly compensated guided by OP 4.12 and the Resettlement Policy Framework of 2017.

Scope of Land Acquisition

A separate Resettlement Action Plan (RAP) will be prepared for this sub-project as it has several anticipated land acquisition issues which entail land acquisition for all the pipeline servitudes, storage tanks and pump stations. A 5m pipeline servitude will be required to connect the Dukwi Waterworks with various villages of the scheme to transfer the water from the Dukwi Wellfield. This will be undertaken through application for way-leaves through the Department of Roads.

The water storage tanks, and pump stations will both require land acquisition which will require direct application for land through the Ngwato Land Board via the relevant Sub-Land Boards. The proposed sites are within tribal land and therefore under the jurisdiction of Ngwato Land Board. The Nata reservoir tank will require additional land to accommodate the reservoir tank and hence an application for extension of the current plot will be made through the Nata Sub-Land Board.

3 . REGULATORY REQUIREMENTS POLICY, LEGAL AND INSTITUTIONAL FRAMEWORK

The relevant national, regional, and international regulatory frameworks along with World Bank's Safeguard Policies and World Bank Group Environmental, Health and Safety (EHS) Guidelines applicable to Sowa Water Supply Scheme project will be discussed and analyzed to establish synergies and gaps with recommendation for potential solutions. In addition, institutions involved in the preparation and implementation of the sub-project will be presented highlighting the specific roles and responsibilities. The analysis of all the policies and laws did not identify any potential litigation issues against the project which may restrict the environmental appraisal.

3.1 National Acts

3.1.1 Environmental Assessment Act No 10 of 2011 and Environmental Assessment Act of 2020.

The Environmental Assessment (EA) Act (Act No. 10 of 2011) requires that all the developmental interventions be subjected to an environmental impact assessment. Such interventions include both existing and proposed developments. The assessment must identify, evaluate, and mitigate impacts throughout the development life cycle, namely Pre-construction, Construction, Operation and Decommission. The Environmental Impact Statement (EIS) developed from the EIA study must include an Environmental Management Plan (EMP) and is subject to review and approval by the Department of Environmental Affairs (DEA). The EMP must follow the life cycle categories so that impacts unique to specific stages are clearly addressed.

The Act in Part V Section 20 clearly indicates the need for monitoring the implementation of mitigation measures to ensure compliance to agreed mitigation measures during and after project implementation. The Act imposes a fine not exceeding P100 000 or a term of imprisonment not exceeding five years or both to any person who contravenes the provisions of the Act.

The EA Act is read together with the Environmental Assessment Regulations of 2012, which outline the requirements for environmental assessment reports in terms of content as well as the qualifications of the persons expected to undertake environmental assessment work. Schedule 3 of the Regulations highlights fees that the authority charges for services rendered based on the overall cost of a project.

The key components of the EA Act, applicable to the proposed development are:

- Requirement for a project brief.
- Requirement for public participation during scoping.
- Preparation of terms of reference for the environmental statement.
- Review process including informing the public of the review process (at the developer's expense).
- Conduct of public hearings in the event of public concern over the development activity.
- Approval process by the competent authority.
- Authorization of the statement and possibility of validity period attached to an authorization granted by the competent authority.
- Requirements for monitoring during the post EIA period.
- Submission of evaluation reports to relevant technical departments or local authorities.
- Environmental audits to be carried out by the competent authority.

- Failure of developer to comply with the provisions of the audit, may result in a revoked or modified authorization; and
- The terms of reference, statements, reports, and decisions prepared under the Act shall be public documents.

The EIA and ESMP must be followed to ensure proper mitigation and monitoring of potential impacts arising from the development and operation of the sub-project.

3.1.2 Environmental Assessment Regulations (2012)

The purpose of the EA Regulations is to aid implementation of the EIA process as per the EA Act, 2011. The Regulations provide direction in achieving the implementation of the Act. They are also designed to integrate the EIA process into planning process to ensure timely consideration of environmental factors and to avoid delays. The regulations provide guidance on how exercises such as EIA should be presented (Form D & E, Regulation 7 and 8), including the content of the report. Therefore, to fulfil this requirement this ESIA report will be amended before submission to the DEA to follow the outline as required by the Regulations.

3.1.3 Water Works Act (1962)

The Act provides for the constitution of water authorities in townships, confers certain duties and powers upon such water authorities, provides for the acquisition of existing waterworks and for matters incidental thereto.

This Act aims to encourage and protect water supply systems. Waterworks areas must be delineated and gazetted. The Water Authority (water Utilities Corporation or WUC) receives the water development rights and has the duty to develop a water supply system. The Authority effectively manages the monopoly of water supply. The Act empowers WUC to provide water supply services to the beneficiary villages as they have been declared as water works areas. The Act also empowers WUC to protect the water transfer scheme against vandalism and the quality of water.

3.1.4 Water Utilities Act (1970)

The Act provides for the establishment of a corporation to be known as the WUC for the supply and distribution of water. WUC is a state-owned enterprise established in 1970 through an Act of Parliament to provide water in urban areas. The mandate of the corporation was expanded in 2009 under the Water Sector Reforms Programme to include management of water and wastewater services in the settlements previously managed by the Department of Water Affairs (DWA) and Local Authorities. The mandate of the Corporation is to provide portable and wastewater services throughout the country.

This Act is relevant to the sub-project as it demonstrates that WUC is the legal institution responsible for the design and implementation of the water supply scheme.

3.1.5 Water Act (1968)

The Act establishes the Water Apportionment Board (WAB) and makes provisions concerning rights in respect of water and related matters. It declares all water as public and makes the pollution of public water an offense. Anyone wishing to discharge into public water would need to do so with permission from the Water Registrar. In addition, it introduces the issuing of water rights for use of public water other than for watering stock, drinking, washing and cooking or use in a vehicle.

Tampering or diversion of public streams by individuals also becomes an offense, unless granted permission through the issuing of a water permit. Part IV section 17 (1, iii) prohibits the pollution of water used in these activities to an extent that it causes injury, directly or indirectly to public health, animal and plant lives.

This Act is relevant as water rights for the boreholes were obtained from WAB.

3.1.6 Waste Management Act (1998)

The Act provides for the management and control of waste. According to the Act⁸, waste is defined as household, industrial, commercial, clinical, or hazardous waste all of which constitute the umbrella term-controlled waste. The Act establishes a system for the registration and licensing of waste disposal carriers and facilities and introduces waste management plans and various enforcement powers. WUC must be cognisant of the requirements of this Act as the proposed sub-project will generate various waste types during the different project phases.

3.1.7 Waste Management Strategy (1998)

The Strategy stipulates that waste management will be carried out in a manner that protects human health and the environment and ensures prudent use of natural resources. It captures the principles of prevention; the polluter pays principle; and the principle of cooperation. The strategy has adopted an internationally acceptable Waste Management Hierarchy (i.e., waste reduction, waste reuse and recycling, treatment and disposal) to minimise waste. The Strategy's guidelines and case studies provide a detailed framework for site selection, identification of key issues and treatment of human and other waste generated during the construction of the sub-project.

3.1.8 Tribal Land Act (1970)

The Act provides for the administration of tribal land by Land Boards. This Act (CAP 32:02) describes the responsibility of tribal Land Boards relating to tribal land and explains their authority in relation to subsequent land issues. It explains the procedure and actions to be taken in the allocation and compensation for lost tribal land. The Act articulates, under Section 33(2), that it is essential that direct payment of compensation be made to the claimants.

The Act is an important reference guide to the compensation procedures if uptake of parts of property is considered an option.

3.1.9 Mines and Minerals Act (1999)

The Act has a provision for regulations which relate to, among others, the protection of the environment. It specifies the developer's environmental obligations so that environmental damage is minimised, and that rehabilitation of the site is undertaken within a reasonable time. These obligations include:

- a) As far as possible, the preservation of the natural environment, minimisation of waste, and prevention and treatment of pollution and contamination.
- b) Rehabilitation from time to time and ultimately reclamation in so far as is practicable in a manner acceptable to the Director of Mines.

⁸ Waste Management Act (1998) p.4

- c) For any operations (such as excavation, waste dumps, and ponds), the undertaking of appropriate measures from time to time to maintain and restore the topsoil of affected areas and otherwise restore land substantially to a condition in which it was prior to the commencement of the operations; and
- d) In the event of an emergency, which, among others, affects natural or biological resources, taking immediate actions as directed by the Director of Mines.

This Act shall be used to guide most of the excavation activities conducted by WUC in terms of construction of access roads, trenching, and any land clearance.

3.1.10 Mines, Quarries, Works and Machinery Act (1978 and as amended in 2005)

The Act provides for the safety, health and welfare of persons engaged in prospecting, mining and quarrying operations including any works which are part of and supplementary to mining and quarrying operations. It also makes provision with respect to the inspection and regulation of mines, quarries, works, and of associated machinery, as well as for matters accompanying the aforementioned. This Act provides regulations as to among others, the conduct required from the contractor, supervisor and employees at a project location.

The obligations of these Acts respectively should be observed by WUC to ensure preservation of the natural environment and maintenance and restoration of land suitability to a condition in which it was prior to commencement of the sub-project, and to ensure the required working conditions for individuals working in various project areas.

3.1.11 Noise levels - BOS 575: 2013

Botswana has set permissible noise standards for specific environments. These are to be complied with by controlling noise generation activities and use of machinery. For this purpose, there should be continuous noise monitoring by the contractor to keep to the thresholds of noise. The maximum permissible noise for specific environments is listed in **Annex 15**.

The standard indicates that for monitoring purposes, measurement of noise shall be done at the receiving point. The standard is relevant to the sub-project as it provides threshold limits for which noise exposure during project implementation should be measured against.

3.1.12 The Atmospheric Pollution (Prevention) Act (1971)

This Act is intended for the prevention of the pollution of the atmosphere from industrial processes. The Act requires that Air Pollution Control Officers are satisfied that proposed industrial activities do not conflict with local land uses within the project environs.

The flexibility or dynamism of the Act in terms of regulations is provided in Section 15. In view of this, the Department of Waste Management and Pollution Control (DWPMC) and Botswana Bureau of standards (BOBS) have developed standards for air quality indicating allowable maximum measurement of major indicators of pollution such as carbon-monoxide, and Nitrogen dioxide among others. The Act is relevant to the proposed project because there will be emissions from the equipment (e.g. excavators, diesel fuelled backup generator), vehicles and other combustion processes that will produce smoke and other emissions resulting in air pollution.

3.1.13 Herbage Preservation (Prevention of Fires) Act (1978)

An Act to prevent and control bush and other fires. Section 4(1) of the Act prohibits, without permission any person from setting fire to any vegetation on land, which he is not the owner or in lawful occupation. A person who wishes to burn vegetation on his or her land shall give a notice to this regard to local authorities. A Committee may prohibit burning of vegetation under section 7. Section 5 introduces a general duty to extinguish fires. Firebreaks may be constructed between adjoining lands in accordance with section 9. A Committee may also order the construction of firebreaks (section 10). The Act aims to prevent and control bush and other fires. In order to preserve existing vegetation on land, the Act defines as growing or standing vegetation, any tree or part thereof and any bush, shrub, brushwood, undergrowth, grass, crops or stubble.

This Act has to be followed by WUC through their appointed Environmental Officer during the development to ensure that vegetation is preserved and bush fires are minimised.

3.1.14 Agricultural Resources Conservation Act (1973)

The Act makes provision for the conservation and improvement of the agricultural resources of Botswana. The Act defines agricultural resources in Section 2 as soils, water, animal life and fauna (animals, birds, reptiles, fish and insects) and other things to be declared as agriculture resources by regulations. By this definition, the Act covers a wide range of environmental issues, which are relevant to the project provision. Sections 16 and 18 of the Act explicitly provide for the protection of the physical environment including the protection of slopes, protection of land against erosion, preservation of vegetation, prevention of silting of water resources, preservation of the soil and its fertility and the drainage of land (construction, maintenance, or repair of artificial or natural drains, gullies, contour banks). All construction and operations activities in the working sites must be in line with this Act such that environmental degradation of the area is minimized if not avoided.

3.1.15 Wildlife Conservation and National Parks Act (1992)

The Wildlife Conservation and National Parks provides for the protection of game animals in Botswana. In Part IV, section 17 of the Act, it is specified that “No person shall, except only under and in accordance with the terms and conditions of a permit issued by the Director of the Department of Wildlife and National Parks under section 39 or section 40 hunt or capture any protected game animal”. Part V, section 18 of the Act also refers to partially protected game animals throughout Botswana, and that no person shall, except under and in accordance with the terms and conditions of a licence or permit issued under the Act, hunt or capture any partially protected game animal.

The proposed water supply sub-project is located close to major conservation areas of Botswana and Zimbabwe; Makgadikgadi and Nxai national parks, the Makgadikgadi Salt Pans, and the Hwange complex of protected areas of Zimbabwe. North of the project area in Zimbabwe there are a series of conservation areas (i.e., Matetsi, Hwange National Parks, Kazuma National Park, and Wildlife Management Areas (WMAs)), generally arranged linearly along the international boundary. Therefore, there is an abundance of wildlife and veld products. In accordance with this Act, personnel engaged to work in the sub-project should not hunt or harvest veld products without permission from the Local Government Act (2012)

According to the Local Government Act, a council may after consultation with the community make bye-laws for the area in respect of which it has been established, or any part thereof, in respect of; all matters as it considers necessary or desirable for the maintenance of the health, environment, safety and well-being of the inhabitants of that area or that part; all or any of the functions set out in the

Schedule 1 (e.g. water supplies, health and sanitation), and prescribing service and user fees set out in Schedule 3 and 4 (e.g. property rates, refuse removal services); and prescribing, controlling and regulating levy on private land.

The byelaw may require acts or things to be performed to the satisfaction of a prescribed person and may empower a prescribed person to issue directions to any other person requiring acts or things to be done, imposing conditions and prescribing periods within or before which those acts, or things shall be performed or done or those conditions shall be fulfilled.

3.1.16 Road Traffic Act (2001)

According to the Act, a road authority may cause or permit traffic signs to be placed on or near a road. Traffic signs shall be of the prescribed size, colour and type except where the Minister authorizes the erection or retention of a sign of another character. The Act goes on to prohibit the encroachment and/or damage to roads without written permission from the appropriate road authority.

The Act requires that if a vehicle is involved in or contributes to any accident whereby the death of or injury or damage to any person, property, cattle or other domestic animal is caused, the driver of the vehicle shall give his name and address, the name and address of the owner of the vehicle and of the company with whom the vehicle is insured and the registration number of the vehicle. In the case of such an accident, the driver of the vehicle shall report the accident at a Police station or to a Police officer as soon as it is reasonably practicable to do so and in any event within 48 hours immediately after the accident. This Act should be used by WUC when applying for the use of road traffic warning signs for the proposed sub-project, especially at the entrance points to the contractor's camps and labourer's camps that will be located off a main road.

3.1.17 Monuments and Relics Act (2001)

Preserves and ensures sustainable use of historical as well as archaeological resources. Section 18 (1) of the Act makes it an offence for anyone to make an alteration to, destroy or damage any archaeological remains without the written consent of the relevant authorities. The Act, in section 19 (2), makes it a pre-requisite for anyone wishing to undertake any major development to conduct an Archaeological Impact Assessment (AIA). The Act further allows for mitigation by a person of approved credentials in cases where archaeological remains occur within the proposed area where developments are to take place. One other important and relevant aspect of the Act that needs to be emphasised is Section 10 subsections 2 and 3. Here the Act outlines that; 'Land on which a national monument is situated shall not be used for purposes other than the protection and preservation of the national monuments, unless approval has been given by the relevant authorities'.

Subsection 3 on the other hand stresses that 'no development within 1 kilometre of any national monument shall take place without the minister's prior written approval, which approval shall not be granted unless the Minister is satisfied that-

- a) Such development will not be incompatible with the preservation of the national monument; or
- b) It is in the national interest for such development to be undertaken'.

It is in this regard that the importance of a detailed archaeological impact assessment is emphasised for WUC project so as to establish the presence and/or absence of archaeological sites within and around the sub-project area.

3.1.18 Conveyance of Dead Bodies Act (1933)

The Act establishes the procedure for conveyance of dead bodies from one district to the other. It provides that authority must be sought from the District Administration officer who shall satisfy himself or herself that such conveyance of dead bodies does not present a health risk to the community or places through which it traverses to its internment site. Further, the Act provides that re-internment must be done within 24 hours of the arrival of remains at the reburial site. This Act is normally triggered when sites have been identified with human burial remains, which sites may have to be salvaged.

3.1.19 Town and Country Planning Act (2013)

The Act provides for the orderly and progressive development of land in both urban and rural areas in order to preserve and improve the amenities thereof. The Act requires that development plans for all areas declared as planning areas be approved (Section 11). Part II of the Second Schedule makes provision for buildings and building plots regarding size, height, lines, coverage, space, car parking, and other requirements for regulating and controlling such matter.

3.1.20 Children's Act (2009)

The Act to make provision for the promotion and protection of the rights of the child; for the promotion of the physical, emotional, intellectual, and social development and general well-being of children; for the protection and care of children; for the establishment of structures to provide for the care, support, protection and rehabilitation of children and for matters connected therewith.

3.1.21 Domestic Violence Act (2008)

The Act seeks to provide protection of survivors of domestic violence. According to the Act domestic violence is defined as any controlling or abusive behaviour that harms the health or safety of the survivor including, physical abuse or threats, sexual abuse, or threats, emotional, verbal, or psychological abuse, economic abuse, intimidation and harassment. The Act lists penalties for those found to be in violation of the Act.

The sub-project will conduct sensitization and awareness training to community members and workers to mitigate against exploitative, abusive and gender-based violence, especially against women, children and elders. It will also provide a screening of social and legal services for survivors to access as part of the GM. In addition, the contractors ESMP and bidding documents will refer to the codes of conduct which are included in **Annex 5**.

3.1.22 Employment Act (2010)

The Act makes provision for regulating employment and labour issues regarding promoting harmonized relations between employer and employee and specifically:

- Regulates the contracts of employment
- Defines categories of wages paid to employees
- Ensures that workers have rest periods
- Ensures the employment of females and regulates issues of confinement and maternity.
- Details labour health areas
- Defines the minimum age of employment, which is 14 years, when the child is not attending school. The Act states that he/she may be employed on light work not harmful to his/her

health and developments. The child should work for a maximum of six hours a day and 30 hours a week. While adults work for eight hours a day and not more than 48 hours a week.

- Indicates that every employee shall be granted by the employee in every seven consecutive days, a rest period comprising at least 24 consecutive hours which period ordinarily be or include a Sunday. Employees are not required to work more than five consecutive hours without a period of rest which shall not be less than 30 minutes.

The Act is of relevance to the sub-project because workers will be employed to undertake civil works. The contractor should comply with all the provisions of the Act when procuring labour for the project. Contracts of employment should be in writing. In addition, resting periods and wages should meet the minimum or better at the prescribed rate at the time of employment. All employment records must be kept. Despite the age limit of 14 years for employment as specified in the Employment Act of Botswana, the minimum age of 18 years as stipulated by the World Bank should prevail when procuring labour. The appointed contractor should insure all workers on site particularly for Workman's Compensation prior to civil works. In terms of employment of women, the contractor is to allow maternity leave, pay maternity allowance and allow time for the mother to nurse the child.

3.1.23 Refugee (Recognition and Control) Act (1968)

An Act to make provision for the recognition and control of certain political refugees; to prevent in certain circumstances their removal from Botswana under the Immigration Act and to make provision incidental thereto or connected therewith. The Act states that;

- *(1) A recognized refugee who is not detained under section 9 (2) or other lawful authority may leave Botswana at any time.*
- *(2) A recognized refugee shall on his departure from Botswana cease to be a recognized refugee.*

Restriction on removal and control of refugee

Section 9 (1)

Subject to section 10, a recognized refugee shall not be removed from Botswana under the provisions of the Immigration Act except to a country approved by the Minister, being a country in which, in the opinion of the Minister, the life or freedom of the refugee will not be threatened on account of his race, religion, nationality or membership of a particular social group or political opinion:

Provided that nothing in this subsection shall prevent the removal, under the provisions of any law, of a recognized refugee to any country whatsoever where, in the opinion of the Minister, such removal is desirable on the grounds of national security or of public order or where the recognized refugee has been convicted by a final judgment of any court of a serious crime which, in the opinion of the Minister, indicates that the recognized refugee constitutes a danger to the community.

This Act is relevant to the sub-project because Botswana has established a refugee camp at Dukwi village for refugees that fit the criteria as stated above.

3.1.24 Factories Act (1979)

The Act regulates the conditions of employment in factories and other places about the safety, health and welfare of workers and for the safety and inspection of certain plant and machinery and for purposes incidental to or connected with the matters aforesaid. It also states that where grinding,

sieving or any such process gives rise to dust, gas or vapor steps should be taken to prevent the accumulation of dust, vapor or gas, and requires the need for protective clothing. The Act states that where employees are exposed to wet conditions or any such environment liable to cause injuries, they should be provided with necessary suitable gloves, footwear, goggles, head or face coverings. Where electric welding is done, workers should be provided with safety spectacles to avoid exposure of the individual's eyes to the electric arc flash.

3.1.25 Public Health Act (2013)

The Act protects the quality of water used by the public, by controlling the disposal of polluted water and control of mosquito larvae. The following shall be deemed to be a nuisance liable to be dealt with in the manner provided in this part:

- Any well or other source of water supply or any cistern or other receptacle for water, whether public or private, from which the water is used or is likely to be used by human beings for drinking or domestic purposes or in connection with the manufacture or preparation of any article of food intended for human consumption, which is in the opinion of a health officer polluted or otherwise liable to render water injurious or dangerous to health.

The management water reservoir and storage tanks shall be managed in accordance with the Act.

3.1.26 Emergency Powers (COVID-19) Regulations (2020)

In recognition of the public health and safety risks posed by the COVID-19 pandemic, the President exercised his emergency powers under section 3 of the Emergency Powers Act to enact the COVID-19 emergency regulations (2020)⁹. The regulations assist in the response to COVID-19 given its evolving nature and are revised according to developments of this pandemic within the country. The key relevant aspects of the regulations are:

- i. Lockdown – During the state of emergency proclamation, the President may declare a national lockdown for the whole of Botswana, or a lockdown in a location, or area of Botswana.
- ii. Prevention of introduction or spread of COVID-19 - During the state of emergency, no person shall enter Botswana other than a citizen or a non-citizen resident in Botswana. However, the President has the power to make exceptions to allow entry into Botswana.

The Regulations are critical to the sub-project since outside labour will come into the project area from local, regional, and possibly international places which increases possible transmission and spread of the virus.

3.2 STANDARDS

3.2.1 Water Quality Standards

BOS32:2015 standard specifies two classes of water that are suitable for use as drinking water, defined in terms of physical, organoleptic, chemical, and microbiological constituents. Class I is considered

⁹ Emergency Powers (COVID-19) Regulations (2020): <https://covid19portal.gov.bw/covid-19-regulations>

acceptable for whole lifetime consumption, while Class II specifies requirements that are the maximum allowable for short term consumption. The Class I limit for TDS is 1000 mg/l whereas the Class II TDS limit is 2000 mg/l. The water from the proposed water supply scheme should meet the requirements of this standard especially since water quality tests indicate that the water is saline (high sodium concentrations), and the community also raised several concerns regarding the water quality.

3.2.2 Noise standards

In 1999, the World Health Organisation (WHO) produced Guidelines for Community Noise, prescribing health-based levels of acceptable noise under different scenarios. Main sources of community noise include road, rail, construction, and public works. According to the WHO guidelines (1999), hearing impairment is not expected to occur at LAeq 8h levels of 75 decibels or lower, even for prolonged occupational noise exposure. **Table 32** highlights WHO guideline values for noise.

Table 32: Guideline values for community noise in specific environments

Specific environment	Critical health effect(s)	LAeq [dB(A)]	Time base [hours]	L _{Amax} [dB]
Outdoor living area	Serious annoyance, daytime and evening	55	16	-
Industrial, commercial shopping and traffic areas, indoors and outdoors	Hearing impairment	70	24	110
Impulse sounds from toys, fireworks and firearms	Hearing impairment	-	-	140 (adults) 120 (children)

Source: WHO, 1999.

Where;

L_{Aeq} [dB(A)] Is the energy average equivalent level of the A-weighted sound over a period of time

L_{Amax} [dB] Is the maximum noise level

3.3 POLICIES

3.3.1 Botswana's Vision 2036 (2016)

The theme for Vision 2036 is "Achieving Prosperity for all". It has four pillars which have been aligned with Global Sustainable Development Goals (2015). The four pillars are: Sustainable Economic Development, Human and Social Development, Sustainable Environment, and Governance, Peace and Security.

As the overarching objective of the project is to achieve or enhance human and social development of the people of Botswana, this project is consistent with the sustainable development vision for Botswana and the global goals.

3.3.2 Compensation Guideline for Tribal Areas (2010)

These are a set of guidelines which work in accordance with the Tribal Land Act (1970) as amended. The guidelines are therefore provided to handle all customary rights and common law grants as given in the Act. The Compensation Guidelines document provides ways in which the people affected by any project of national significance can be compensated for their land and assets. This document will

become valuable in instances where people and their productive assets are physically relocated and will therefore be used to assist in procedures to be followed in the compensation for disturbances caused by the activities related to the proposed project such as the construction of the water tanks, pump stations and installation of pipes.

3.3.3 Land Board Policy (2019)

According to the Land Board Policy, a legally recognized loss of land rights or displacement is guided by compensation policy which states that any person who is required to vacate land under the provisions of Tribal Land Act may be granted the right to use other land, if available, and shall be entitled to adequate compensation, it explains the procedure and actions to be taken in the allocation and compensation for lost tribal land. The Act articulates, under Section 33 (2), that it is essential that direct payment of compensation be made to the claimants.

The World Bank OP 4.12 covers direct economic and social impacts that both result from Bank assisted investment projects and are caused by the involuntary taking of land resulting in:

- (i) relocation or loss of shelter.
- (ii) loss of assets or access to assets; or
- (iii) loss of income sources or means of livelihood, whether the affected persons must move to another location. It applies to all project activities that result in involuntary resettlement, regardless of the source of financing.

The policy requires the borrower to prepare a resettlement action plan or a resettlement policy framework that includes measures to ensure that affected people are informed about their options and rights; consulted on, offered choices among, and provided with technically and economically feasible resettlement alternatives; and provided prompt and effective compensation at full replacement cost for losses of assets and international valuation standards and principles.

3.3.4 Wildlife Conservation Policy (1986)

The Policy calls for the preservation of wildlife as a way of economic diversification. It also points out that wildlife areas are not restricted to Game Reserves and National Parks but can also be found in communal areas. The over-riding philosophy of the policy is that utilization of wildlife should not be conducted in a way that is detrimental to the continued existence of the resource base. Therefore, WUC has to ensure that wildlife in the area is not adversely affected by this development.

3.3.5 Botswana Threatened Species Management Policy, Implementation Strategy and Action Plan (2007)

The Policy establishes a complete scheme for the protection and recovery of Threatened Species and for the recording of endemic species for the purpose of protecting them if the species are listed as threatened or data about them is deficient.

The purpose of the policy is to implement measures to:

- a) Prevent the extinction of Botswana's flora and fauna.
- b) Provide for the recovery of those species that are Critically Endangered, Endangered, or Vulnerable because of human activity and other threats.
- c) Inventory Botswana's endemic species to be able to identify those that are Critically Endangered, Endangered, or Vulnerable and to provide for their recovery and to provide

protection for and a research plan that determines the actual status of those deemed Data Deficient.

- d) Establish an institutional and participatory framework for the implementation of the Threatened Species Management Policy; and
- e) Promote and ensure a responsible, accountable, and transparent decision-making process in Threatened and endemic species management.

In line with this strategy, WUC must ensure that in the event threatened or endemic species are found within the project area, wildlife authorities are notified such that the species are protected.

3.3.6 National Conservation Strategy (Coordinating) Agency (1990)

The White Paper provides for the use and conservation of natural resources. It captures the polluter-pays-principle and contains rather general solution packages for several environmental concerns from activities that might harm natural resources. The development will likely result in the creation of new access roads connecting the storage reservoir and new pump stations. WUC must take cognisance of natural resources that may be of conservation significance.

3.3.7 National Policy on Natural Resources Conservation and Development (1990)

The National Policy on Natural Resources Conservation and Development was approved by the National Assembly of Botswana on the 17th December 1990. The policy is aimed at the integration of environmental issues in the national development planning process. To ensure that the development does not result in environmental issues such as pressure on water resources in the area; degradation of rangeland pasture resources; depletion of wood resources, exploitation of veldt products; depletion of wildlife resources and pollution, the proposed project should be designed to limit the environmental costs and to enhance the environment in line with this policy.

3.3.8 National Policy on HIV/AIDS (2012)

This policy arises from and reflects the current socio-economic and legal situation in which the national response to HIV and AIDS is being undertaken. It takes cognizance of the fact that due to age, gender, socio-economic status, sexual orientation or disability; some Batswana are more vulnerable to the devastating effects of HIV and AIDS than others.

Government of Botswana partners must cooperate with the national coordinating body, NACA, for the national response to HIV and AIDS by sharing relevant information that may be requested which will assist with reviewing their contribution to response achievements as well as ensuring that a comprehensive overview of the national response is maintained. To promote the necessary coordination and management of the multi-sectoral national response to HIV and AIDS at all levels, formal coordination structures with the appropriate human resources should exist in the public and private sectors and civil society.

Botswana's National Strategic Framework for HIV/AIDS recognizes that highly mobile, mostly male contracted labourers that spend long periods away from home are not only susceptible to HIV and AIDS but that they also fuel the epidemic. Contractors are highly mobile and therefore their chance of contracting and spreading the HIV/AIDS virus becomes high. The proposed project is envisaged to attract job seekers to the project area; therefore, it is very imperative to come up with measures to prevent the spread of HIV/AIDS.

3.3.9 Revised National Policy on Rural Development (2002)

According to the Revised National Policy for Rural Development the specific objectives of the policy are to; (1) reduce rural poverty; (2) promote sustainable livelihoods; (3) retain subsistence livelihood opportunities for those without adequate alternatives through the establishment of a viable rural commercial sector; (4) stimulate rural employment and income generation through identification and exploitation of profitable private sector alternatives to livestock and arable agriculture, such as rural industries, services, and crafts; such activities can serve to attract skilled youth to rural areas, (5) maintain and improve rural capital in the form of skilled labour, economic infrastructure and exploitable natural resources; (6) increase agricultural productivity; (7) improve the rural development extension services; (8) reduce, where socially acceptable, the livelihood dependency of people on Government, whilst maintaining appropriate social protection; (9) promote a participatory rural development process, through the involvement of local communities, non-governmental organisations, community-based organisations and the private sector; and (10) develop an integrated approach towards the reduction of the HIV/AIDS epidemic.

It is anticipated that some of the objectives of this policy such as reduction of rural poverty, increased agricultural productivity, stimulate rural employment and income generation and promoting sustainable rural livelihoods will be achieved in part through this project. However, the project should be careful not to defeat the objective of reducing dependency on government by providing almost every requirement of the investment to beneficiaries in the pretext of assisting the disadvantaged.

3.3.10 National Strategy for Poverty Reduction (2003)

The National Strategy for Poverty Reduction sets poverty reduction as its main goal consistent with the country's commitment to "build a compassionate, caring and just nation". It charts the strategic pathways for poverty reduction, primarily through broad based labour-absorbing economic growth, the provision of basic quality social services to the poor, the promotion of cost-effective pro-poor social safety nets, an enhanced effective response to the HIV/AIDS epidemic, and strengthening institutions for the poor, and provides a multi-sectoral approach for overseeing the design, implementation and monitoring of poverty reduction interventions.

The project proponent aims to target the disadvantaged sections of the community, including the poor, to be the main beneficiaries of this project, thus further contributing towards the attainment of the objectives of this strategy.

3.3.11 National Policy on Destitute Persons (2002)

The Policy aids poor households through the provision of food. The registered destitute must make every effort to:

- Find employment if he or she is physical and mentally able
- Produce at least part of his or her food if physical and mentally able
- Partake in any activities sponsored by council staff aimed at his or her rehabilitation and financial improvement
- Use the assistance given only for the specified purpose.

This policy is relevant to the sub-project as destitute persons are found in the project villages. Destitute persons capable of working should be identified through the social and development officer and employed in this sub-project, if possible.

3.3.12 Affirmative Action Framework for Remote Area Communities (2014)

The Framework was conceived to accelerate the implementation of the revised Remote Area Development Programme (RADP) which is aimed at promoting equity in the remote area communities. It is guided by the revised national policy for rural development. Its objectives are to:

- Promote social inclusion of people living in recognized remote area settlements, both individually and/ or as a family in the development of the country.
- Provide development infrastructure in the recognized remote area settlements for the Remote Area Communities (RACs) to be able to participate in the economic and social activities of the country.
- Enable RACs to build sustainable livelihoods, promote self-reliance and sustainable utilization of natural resources.
- Enhance RACs access to social services, poverty eradication initiatives and other national development programmes.
- Facilitate community participation of Remote Area Communities in community development initiatives; and
- Enhance collaboration with Non-Governmental Organizations, (NGOs) / Community Based Organizations (CBOs)/ Faith Based Organizations (FBOs), Development Partners and Private sector on the development of RACs.

The goals of the Affirmative Action Framework are aligned to the Rural Development Council's. Its focus areas are:

- Provision of basic services and Infrastructure development
- Agriculture development and food security
- Support and protection of indigenous knowledge
- Rural entrepreneurial development
- Harmonization of social welfare programs.

The Framework is relevant to the sub-project as it supports conscious efforts for the employment of people from remote area settlements, promote water supply in remote areas and harmonizes social welfare programmes. It therefore ensures special consideration is given to people from the project villages during hiring.

3.3.13 Revised Guidelines for Implementation of Ipelegeng Programme (2012) (Labour-Based Public Works Programme (Ipelegeng))

Ipelegeng was started in the 1960s as a poverty eradication strategy. This programme provides temporary employment to members of the community in various settlements throughout Botswana through temporary supplement to rural incomes through wages. Unemployed residents in the project villages who have registered with the programme are offered temporary manual work which is on a rotational basis among the community members. Ipelegeng workers work for six hours and earn P547 (US \$45.00) per month for the three months that they are enrolled for. Ipelegeng workers thereafter receive nothing for the subsequent months as they are laid off to make way for others due to the rotational system of employment under this programme (SLR Consulting, 2015:33).

3.3.14 Remote Area Development Programme (2009)

The revised Remote Area Development Programme was developed against the backdrop of challenges encountered in the implementation of projects for the development of the Remote Area

Communities. RADP aims is to uplift Remote dwellers standard of living, prioritizing their needs and delivering results.

In case of Tutume Central, RADP seeks to promote creation of sustainable livelihoods for part of Tutume Central communities through constant water supply.

3.3.15 Revised National Settlement Policy (2004)

The overall goal of the policy is to provide a comprehensive set of guidelines for national physical planning and to provide a framework for guiding the distribution of investment in a way that reflects the settlements population size, economic potential, level of infrastructure and settlements role as service centers. The objectives of the policy are to:

- Provide guidelines and long-term strategy for the development of human settlements
- Rationalize and promote the optimal use of land and the preservation of the best arable land.
- Promote the conservation of natural resources for the benefit of the present and future generations

In relation to project villages, this policy is relevant on the emphasis of development and job creation in terms of provision of adequate and better standard infrastructure and services such as water supply.

3.3.16 WUC's Safety, Health, Environmental and Quality (SHEQ) Policies and Procedures

WUC has comprehensive, Safety, Health, Environmental and Quality (SHEQ) policies and procedures that guides all its operations and also regulates its contractors to ensure that works done are within acceptable environmental principles and standards. The policies and principles among others cover the following:

- Environmental management
- Water conservation Policy
- Environmental Impact Assessment Policy
- Commitment and HSE Management Policy
- Occupational Health and Safety
- Personal Protective Equipment (PPE) Policy
- Implementation and operation of the HSE Management System (Contractor and Contractor Control).

WUC SHE's policies and procedures are relevant to this sub-project particularly during construction as it provides guidelines and procedures for environmental management. The policies apply to all those engaged by WUC for the safety delivery of works.

3 . 4 P L A N S

3.4.1 Botswana Water National Master Plan (BWNMP) (2006)

The 2006 review of the 1991 Botswana Water National Master Plan recommends a strategic switch from supply-oriented water management to Integrated Water Resources Management (IWRM). The latter approach requires that demand and supply measures are balanced, and that water resources are managed as finite, economic, and social resources. It further implies that countries allocate and use water resources efficiently.

3.4.2 National Master Plan for Wastewater and Sanitation (2003)

The plan provides the long-term strategy for sanitation and treatment of wastewater (until 2030). Possible study implications include:

- a) Encouraging re-use and recycling and compliance with the 2030 target of 98% re-use and recycling.
- b) The effluent from treated wastewater should meet the BOS 93 standard and there should be a plan to release the same into the environment as effluent.

3.4.3 National Development Plan 11

Several policy initiatives are required to make sustainable development the core cross-cutting issue of NDP 11. In this context, major programmes, and projects in key sectors such as mining, agriculture, energy, water, manufacturing, and tourism will be subjected to sustainability appraisal, planning and implementation during NDP 11 to ensure that social, economic and environmental objectives are maximised and harmonised.

Prudent management of natural resources is desirable to ensure the derivation of maximum benefits through conservation and equitable distribution of benefits to most the country's population through economic growth and employment creation. During NDP 11, focus will be on the strengthening and/or development of policies and legislation to address threats, as well as measures to enhance the state of the environment. Specific areas will include land, water, minerals, energy, biodiversity and cultural resources, which are key to economic development.

Local knowledge that is unique to a given culture or society, which facilitates communication and local-level decision making in agriculture, health care, food preparation, education, natural-resource management, will be harnessed for economic growth and employment creation. The value of such resources and their implication to economic development should be measured through natural capital accounting to assess the physical stocks of such natural resources and their utilisation.

3.4.4 Botswana Biodiversity Strategy and Action Plan (BSAP) (2004)

The policy was compiled in compliance with the Convention on Biological Diversity (1993), to which Botswana is a signatory. The goal of the BSAP is to contribute to the long-term health of Botswana's ecosystems and related species as well as to encourage sustainable and wise use of resources through provision of a framework of specific activities designed to improve the way biodiversity is perceived, utilised and conserved. WUC should ensure that Rare and Endangered Species as well as unique habitats occurring in the sub-project areas are protected.

3.5 INTERNATIONAL OBLIGATIONS AND AGREEMENTS

3.5.1 Convention on International Trade in Endangered Species (CITES, 1975)

Botswana is signatory to the *Convention on International Trade in Endangered Species (CITES)*, which entered into force in 1975. Its aim is to ensure that international trade in specimens of wild animals and plants does not threaten their survival and it accords varying degrees of protection to species of animals and plants. There is some wildlife in the sub-project areas and therefore WUC must make certain that those involved in the project do not engage in activities that run counter to the convention.

3.5.2 The United Nations High Commissioner for Refugees (UNHCR) (1977)

In 1977, the Executive Committee of the UNHCR noted that only a limited number of states had established procedures for the formal determination of refugee status under the 1951 Convention and its 1967 Protocol. The Committee encouraged states to adopt rules of status determination based on the seven basic procedural requirements that are outlined below:

- First, the Executive Committee recommends that the applicant must address himself to a competent official at the border. It recommends that such an official should have clear instructions on dealing with persons claiming protection relevant to international instruments. This official must act in accordance with the principle of non-refoulement and immediately refer the case to higher authorities.
- Second, the Executive Committee recommends that applicants should receive the necessary guidance as to the procedure to be followed.
- Third, it suggests that there should be a clearly-identified central authority that bears the responsibility of examining refugee requests and taking a decision in the first instance.
- Fourth, applicants should be given the necessary facilities, including the services of competent interpreters, for submitting their case to the authorities concerned and be informed and given the opportunity to contact a UNHCR representative.
- Fifth, applicants recognised as refugees should be informed accordingly and given documentation certifying refugee status. Sixth, applicants not recognised should be given a reasonable time to appeal for a formal reconsideration of the decision, either to the same or a different authority, whether administrative or judicial and, lastly, applicants should be allowed to remain in the country pending decisions on the initial request unless it is deemed abusive to the protection process, and to remain in the country pending an appeal.

This applies to the sub-project due to the presence of the Dukwi Refugee Camp within the project area.

3.5.3 United Nations Framework Convention on Climate Change (UNFCCC, 1994)

The Framework is an international environmental treaty aimed at stabilizing greenhouse gas concentrations in the atmosphere at a level that would prevent dangerous anthropogenic interference with the climate system. The Convention therefore provides the basis for global action “to protect the climate system for present and future generations”.

Parties to the UNFCCC have a number of commitments under the convention, which include:

- a) Submitting a national inventory of emissions and removals of greenhouse gases.
- b) Implementing national programmes to mitigate climate change and adapt to its impacts.
- c) Strengthening scientific and technical research and systematic observation related to the climate system and promoting the development and diffusion of relevant technologies; Promoting education programmes and public awareness about climate change and its likely effects; and periodically submitting comprehensive reports on activities to implement commitments under the Convention.

WUC must regularly maintain the equipment used during project operation such that the amount of carbon emissions is minimized. Further, the developer must also endeavour to monitor the levels of carbon emissions (e.g., consumption of electricity/energy) from the various project components.

3.5.4 Kyoto Protocol (1997)

The Protocol, adopted in 1997, is linked to the UNFCCC to prevent anthropogenic interference with the climate. The Protocol establishes legally binding commitments for the reduction of greenhouse gases and fluorocarbons. As of December 2006, a total of 169 countries and other governmental entities had ratified the agreement including Botswana, hence adopting the common responsibility that other countries have in reducing the greenhouse gas emissions. Examples of carbon emitting equipment likely to be used in the sub-project include trucks, frontend loaders and bulldozers.

3.5.5 Basel Convention (1989)

The Convention, concluded in 1989, controls trans-boundary movement of hazardous waste and its disposal. Botswana is a party to this convention, of which the requirements are regulated by the Department of Waste Management and Pollution Control (DWMPC) through the Waste Management Act (1998). Currently, Botswana does not have a disposal site for hazardous waste; therefore, hazardous waste is transported outside Botswana through DWMPC.

3.5.6 United Nations Declaration on the Rights of Indigenous Peoples (UNDRIP) (2007)

This Declaration affirms the minimum standards for the survival, dignity, security, and well-being of Indigenous Peoples. It was adopted by the UN General Assembly in September 2007. It delineates and defines the individual and collective rights of Indigenous Peoples, including their ownership rights to cultural expression, identity, language, employment, health, education, and other issues. It emphasizes the rights of Indigenous Peoples to maintain and strengthen their own institutions, cultures, and traditions, and to pursue their development in keeping with their own needs and aspirations. It prohibits discrimination against them, and it promotes their full and effective participation in all matters that concern them and their right to remain distinct and to pursue their own visions of economic and social development.

The Government of Botswana endorsed the UN Declaration in 2007 and stated at the 18th session of the UN Permanent Forum on Indigenous Peoples Issues (UNPFII) in April 2019, that: "Botswana continues to make significant progress in addressing the needs and concerns of marginalized communities, including issues relating to respect for cultural diversity, development programs, social services, land distribution as well as participation and consultation. As a result of our national policies and programmes, we have also seen great improvements in the areas of economic empowerment, access to decent shelter, employment, and access to tertiary education, to cite a few. The promotion and protection of human rights remains a top priority for the Government of Botswana. We also attach great importance to the 1948 Universal Declaration on Human Rights, Declaration on the Rights of Indigenous Peoples and other regional and international human rights instruments.'

The project beneficiary villages of Moseitse, Kutamogoree and Manxotae, where there are Indigenous Peoples or vulnerable communities requires the World Bank's OP 4.10 to be triggered. The UNDRIP will guide the implementation of this project to mitigate adverse harms to the rights and well-being of Basarwa, and to ensure that they benefit from this sub-project in line with their culture and priorities.

3.5.7 Report on the African Commissions' Working Group of Experts on Indigenous Populations/Communities (2005)

The African Commission on Human and Peoples' Rights, a sub-body of the African Union, adopted the report of the Working Group. This is the African Commission's official conceptualization of, and

framework for, understanding Indigenous Peoples, and as such it is an important African instrument for recognizing Indigenous peoples in Africa and improving their situation. In its report, the African Commission outlines key characteristics, which identify indigenous peoples and communities in Africa. The report emphasizes that the African Peoples who are applying the term “Indigenous” in their efforts to address their particular social situation are mainly hunter-gatherers and pastoralists, and in some cases, blended livelihoods to account for changes in circumstances due to land loss, the impacts of Government development initiatives, and other factors. The African Commission report emphasizes that the overall characteristics of groups identifying themselves as “Indigenous” Peoples and includes:

- Their cultures and ways of life differ considerably from the dominant society
- Their cultures are under threat, in some cases to the point of extinction
- The survival of their way of life depends on access and rights to their lands and the natural resources thereon
- They suffer from discrimination as they are regarded as less developed and less advanced than other more dominant sectors of society
- They often live in inaccessible regions, often geographically isolated
- They suffer from various forms of marginalization, both politically and socially.

The African Commission report concludes that this discrimination and marginalization threatens the continuation of Indigenous Peoples’ cultures and ways of life and prevents them from being able to genuinely participate in decisions regarding their own future and forms of development. In line with the approach of the UN and the World Bank, the African Commission emphasizes the principle of self-identification, and stresses that the criteria for identifying Indigenous Peoples in Africa is not mainly a question of aboriginality (who was there first) but of the above factors of structural discrimination and marginalization.

The African Commission report addresses the misconceptions around the term Indigenous peoples in Africa and states that the term and discourse of indigenous peoples should be understood as an avenue for the most marginalized to advocate their cause and not an attempt to deny any African his/her rights to their African identity. This report is important as a guidance to understanding and addressing the needs of Basarwa in the context of this sub-project so that they benefit equally from this project and provides an understanding of the applicability of “Vulnerable Communities” in line with OP 4.10 in this sub-project.

3.5.8 UN Convention on the Rights of the Child (CRC) (1995)

It reaffirms that since children are vulnerable to human rights violations, they need special care and protection. As Botswana is a signatory to this convention, no child is to be employed on this water project and due diligence is essential to ensure their safety, including protection from sexual exploitation and abuse.

3.5.9 Convention on the Elimination of All Forms of Discrimination Against Women (CEDAW) (1996)

This Convention was acceded in Botswana in 1999 and establishes not only an international bill of rights for women, but also an agenda for action by countries to guarantee the enjoyment of those rights. The Convention provides the basis for realizing equality between women and men through ensuring women’s equal access to, and equal opportunities in, political and public life. State parties agree to take all appropriate measures, including legislation and temporary special measures, so that women can enjoy all their human rights and fundamental freedoms.

This Convention is relevant to the sub-project as women are not to be discriminated against during employment for temporary/permanent positions and skilled/unskilled labour or for any project activities and benefits.

3.5.10 ILO Convention on Indigenous and Tribal Peoples, 1989 (No. 169) (ILO 169)

While Botswana is not a signatory to the Convention, it is part of international law and will guide understanding of Vulnerable Communities to ensure they benefit from this sub-project in line with their rights and priorities.

The Convention establishes responsibility for Governments to ensure Indigenous Peoples are not discriminated against and to Government socio-economic gaps that may exist between indigenous and other members of the national community, in a manner compatible with their aspirations and ways of life; that the social, cultural, religious and spiritual values and practices of these peoples shall be recognised and protected, and due account shall be taken of the nature of the problems which face them both as groups and as individuals; and that the integrity of the values, practices and institutions of these peoples shall be respected, and that they are properly consulted and able to participate in decision-making about decisions which impact them, among others.

This Convention is relevant to the sub-project as there are vulnerable communities containing Indigenous Peoples within Moseitse, Kutamogoree and Manxotae, as such they are to be involved in the planning, implementation and monitoring through engagement throughout all the phases of the project, in line with OP 4.10.

3.5.11 UN Convention on the Elimination of All Forms of Racial Discrimination (CERD) (1974)

This Convention addresses tackling all forms of racial discrimination, outlining the rights of racial and/or ethnic groups or individuals that need to be guaranteed if everyone is to have equal enjoyment of their human rights and fundamental freedoms.

Women who belong to marginalised racial or ethnic groups often experience discrimination differently than men. The 'gender dimensions' of racial discrimination have been increasingly recognised since the adoption of International Convention on Elimination of all Forms of Racial Discrimination (ICERD) and states parties are now required to incorporate gender analysis into their reports on the implementation of the treaty – which will include the relationship between Violence Against Women (VAW) and racial discrimination.

This convention is relevant to the project as no ethnic group and no gender is to be discriminated against during employment for temporary/permanent positions and skilled/unskilled labour or for any project activities and specific protections to mitigate against gender-based violence as a result of labour influx. This statement further buttresses Botswana Government's commitment in supporting Indigenous Peoples in Moseitse, Kutamogoree and Manxotae villages.

3.5.12 WHO Drinking Water Quality Guidelines

The primary purpose of the Guidelines for drinking-water quality is the protection of public health. The Guidelines provide the recommendations of the World Health Organization (WHO) for managing the risk from hazards that may compromise the safety of drinking-water. The recommendations should be considered in the context of managing the risk from other sources of exposure to these hazards, such as waste, air, food and consumer products.

Objectives of the Guidelines are as follows:

- Support of the development and implementation of risk management strategies that will ensure the safety of drinking-water supplies through the control of hazardous constituents of water. These strategies may include national or regional standards developed from the scientific basis provided in the Guidelines.
- Describe reasonable minimum requirements of safe practice to protect the health of consumers and derive numerical “guideline values” for constituents of water or indicators of water quality. When defining mandatory limits, it is preferable to consider the Guidelines in the context of local or national environmental, social, economic, and cultural conditions.
- Be part of an overall health protection strategy that includes sanitation and other strategies, such as managing food contamination. This strategy would also normally be incorporated into a legislative and regulatory framework that adapts the Guidelines to address local requirements and circumstances

The main reason for not promoting the adoption of international standards for drinking-water quality is the advantage provided by the use of a risk–benefit approach (qualitative or quantitative) in the establishment of national standards and regulations.

Further, the Guidelines are best used to promote an integrated preventive management framework for safety applied from catchment to consumer. The Guidelines provide a scientific point of departure for national authorities to develop drinking water regulations and standards appropriate for the national situation.

In developing standards and regulations, care should be taken to ensure that scarce resources are not unnecessarily diverted to the development of standards and the monitoring of substances of relatively minor importance to public health. The approach followed in these Guidelines is intended to lead to national standards and regulations that can be readily implemented and enforced and are protective of public health.

3.6 World Bank Environmental Safeguards Policies

3.6.1 World Bank (WB) Safeguards Policies Triggered

This section provides a description of the existing regional and international regulatory frameworks including World Bank’s Safeguard Policies and applicable WBG EHS Guidelines to the sub-project that have a bearing on the design and implementation of the water supply scheme. These include the General Guidelines and the industry specific Environmental, Health and Safety Guidelines for Water and Sanitation. The policies are presented in **Table 33**.

Table 33: World Bank Policies Triggered by the Sub-Project

World Bank Safeguards Operational Policy (OP) Triggered by the Botswana Emergency Water Security and Efficiency Project (BEWSEP)	Triggered by the Sowa Water Supply Scheme sub-project	Remarks
OP 4.01 Environmental Assessment (including public participation)	Yes	Preliminary evaluation has identified potential negative environmental and social impacts, thus, there is a need for an environmental and social assessment to ensure appropriate

		mitigation measures are in place during all stages of the sub-project.
OP 4.11 Physical Cultural Resources	Yes	No sites of cultural or historical significance will be used for or affected by the sub-project. Notwithstanding, Chance Find Procedures are described in case of any discovery. Refer to Annex 11 for more details.
OP 4.12 Involuntary Resettlement	Yes	There will be no resettlement based on assessments so far but there is potential for economic displacement because of vendors along the pipeline route especially at Kutamogoree. However, if the vendors are to be disturbed in anyway, the necessary consultations will be held with them to consider the impacts of the relocations on their business. An agreement will be reached which favours their business. A RAP will be prepared based on this and the recently introduced Land Board charges on land expropriation.
OP4.10 Indigenous Peoples Policies	Yes	Three beneficiary villages and Dukwi Refugee Camp have Vulnerable Communities, the Basarwa (San) in Kutamogoree, Moseitse and Manxotae and refugees at Dukwi Refugee Camp. As per OP 4.10, an IPP (VCP) has to be prepared for the four communities.
OP/BP 4.37 Safety of Dams	No	The policy triggered at project level as some of the sub-projects have dams as the water source, but this sub-project has groundwater as the source.
OP/BP 7.50 Projects on International Waterways	No	The policy triggered at project level as two of the sub-projects have influence on international waterways, but this sub-project has not impact on international waterways.

Table 34: Gap Analysis for World Bank Safeguards Policies and Botswana Environmental Act and Regulations

EA Process Stage	WB (Operational Principles)	Botswana Environmental Assessment Requirements	Sub-Project Proposed Gap Filling Measures
Objectives	<p>Environmental Assessment, OP 4.01</p> <p>To help ensure the environmental and social soundness and sustainability of investment projects.</p> <p>To support the integration of environmental and social aspects of projects into the decision-making process.</p>	<p>EA (Amendment) Act, 2020 and Environmental Assessment Regulations, 2021</p> <p>The act requires that all the developmental interventions be subjected to an environmental impact assessment. The Environmental Impact Statement (EIS) developed from the EIA study must include an Environmental Management Plan (ESMP) and is subject to review and approval by the Department</p>	<p>There are no gaps identified and both WB Safeguard Policies and Botswana regulations will be applied.</p>

EA Process Stage	WB (Operational Principles)	Botswana Environmental Assessment Requirements	Sub-Project Proposed Gap Filling Measures
		of Environmental Affairs (DEA).	
Objectives	<p>Physical Cultural Resources- OP 4.11</p> <p>To assist in preserving physical cultural resources and avoiding their destruction or damage. PCR includes resources of archaeological, paleontological, historical, architectural, and religious (including graveyards and burial sites), aesthetic, or other cultural significance.</p>	<p>Monuments and Relics Act (2001)</p> <p>Preserves and ensures sustainable use of historical as well as archaeological resources. Section 18 (1) of the Act makes it an offence for anyone to make an alteration to, destroy or damage any archaeological remains without the written consent of the relevant authorities. The Act, in section 19 (2), makes it a pre-requisite for anyone wishing to undertake any major development to conduct an Archaeological Impact Assessment (AIA).</p>	<p>No gaps identified. It is undertaken under Archaeological Impact Assessment.</p>
Objectives	<p>Involuntary Resettlement OP 4.12</p> <p>To avoid or minimize involuntary resettlement and, where this is not feasible, to assist displaced persons in improving or at least restoring their livelihoods and standards of living in real terms relative to pre-displacement levels or to levels prevailing prior to the beginning of project implementation, whichever is higher.</p> <p>Upon identification of the need for involuntary resettlement in a project, the borrower carries out a census to determine who will be eligible for assistance.</p> <p>Displaced persons may be classified as follows: (a) those who have formal legal rights to land; (b) those who do not have formal legal rights to land at the time the census begins but have a claim to such land or assets provided that such claims are recognized under the laws of the country or become recognized through a process identified in the resettlement plan,</p>	<p>Acquisition of Property Act (1971)</p> <p>The acquisition of property, provides for “authorising the acquisition of property for public and other purposes, and for settling the amount of any compensation to be paid, or any matter in difference”.</p> <p>The Land Control Act (1975)</p> <p>The Act regulates the transactions, which involves the sale and purchase of agricultural land, provides for the control of transactions in agricultural land.</p>	<p>No gaps identified. OP 4.12 will be used with local legislations and the Resettlement Action Framework.</p>

EA Process Stage	WB (Operational Principles)	Botswana Environmental Assessment Requirements	Sub-Project Proposed Gap Filling Measures
	<p>and (c) those who have no recognizable legal right or claim to the land they are occupying</p> <p>Displaced persons are given compensation and resettlement assistance for the land they lose, only if they occupied the project area prior to a cut-off date established by the borrower and acceptable to the Bank.</p> <p>Replacement cost method is used to evaluate assets, and to determine the amount sufficient to replace lost assets</p> <p>Displaced persons are provided timely and relevant information, consulted on resettlement options, and offered opportunities to participate in planning, implementing, and monitoring resettlement. Appropriate and accessible grievance mechanisms are established for these groups</p> <p>As a condition of appraisal of projects involving resettlement, the borrower provides the Bank with the relevant draft resettlement instrument which conforms to this policy, and makes it available at a place accessible to displaced persons and local NGOs, in a form, manner, and language that are understandable to them. Once the Bank accepts this instrument as providing an adequate basis for project appraisal, the Bank makes it available to the public through its InfoShop. After the Bank has approved the final resettlement instrument, the Bank and the borrower disclose it again in the same manner</p>		
Screening	<p>The WB will classify all projects into one of four classifications: high risk, substantial risk, moderate risk or low risk.</p> <p>To determine risk level of a project, the followings are considered: type of investments, location, sensitivity, and</p>	<p>This is the initial stage of the EIA process where the developer submits a project brief to the DEA for screening to determine whether a detailed EIA is required before implementation of the proposed development.</p>	<p>Both the World Bank policies and national laws will be applied.</p>

EA Process Stage	WB (Operational Principles)	Botswana Environmental Assessment Requirements	Sub-Project Proposed Gap Filling Measures
	<p>scale of the project; the nature and magnitude of the potential E&S risks and impacts; and the capacity and commitment of the Borrower (including any other entity responsible for the implementation of the project) to manage the E&S risks and impacts in a manner consistent with the ESSs. An ESRS (Environmental and Social Risk Summary) is prepared to specify the E&S instruments to be prepared. ESRS at Concept Stage is disclosed.</p>	<p>In line with the Act, the regulations provide for two levels of screening, the Mandatory List, and DEA Discretionary List.</p> <p>All activities listed under the mandatory list would be required to carry out a detailed EIA, whilst the DEA using the set criteria, will determine which projects would require an EIA under the Discretionary List.</p>	
ESIA Instrument	<p>Depending on the project risks and impact, a range of instruments and procedures required to meet the ESSs' objectives, these include: Environmental and Social Impact Assessment (ESIA), ESMF, ESMP; environmental and social audit, cumulative impact assessment; and social and conflict analysis. The WB provides general guidance for implementation of each instrument. Based on information provided by the Borrower, the WB will conduct E&S due diligence for all projects requesting for WB support. The Borrower will be required to prepare, submit, and disclose the Environmental and Social Commitment Plan (ESCP), and Stakeholder Engagement Plan (SEP) before appraisal.</p>	<p>The DEA recommendation after receiving the project brief is determined by the Act, and the regulations. The DEA may recommend Strategic Environmental Assessment (SEA), a detailed EIA, an EMP, Waste Management Plan (WMP), or the project may proceed with conditions.</p> <p>For the proposed project a project brief will be submitted to the DEA for their consideration and recommendation.</p>	<p>Both processes will be fulfilled.</p>
Independent Expert	<p>For high risk and complex project, the Borrower may be required to retain independent ESA experts not affiliated with the project to carry out ESA.</p> <p>For high risk projects, especially those related to dam safety, the Borrower should also engage an advisory panel of independent, internationally recognized environmental specialists to advise on aspects of the project relevant to ESA.</p> <p>Experts/consulting firm will be selected through bid process under strict observation of the WB.</p>	<p>An environmental assessment practitioner registered and certified by the Environmental Assessment Practitioners Board (EAPB) shall be engaged to undertake all the environmental assessment statements mentioned above. A list of all registered and certified environmental assessment practitioners are found in EAPB website.</p>	<p>WUC duly appointed a certified EAPB consultant to undertake the ESIA study and compile an independent ESIA report and ESMP.</p> <p>The Sub-project is not of a high risk and complex nature and therefore the normal review processes will be instituted</p>

EA Process Stage	WB (Operational Principles)	Botswana Environmental Assessment Requirements	Sub-Project Proposed Gap Filling Measures
<p>Public consultation, stakeholder engagement, and GM</p>	<p>During the ESA process, the Borrower consults project affected groups and interested parties about the project's environmental aspects and takes their views into account.</p> <p>In line with OP 4.01 and OP 4.10 preparation of a Stakeholder Engagement Plan (SEP), information disclosure, and establishment and operations of a GM are required to ensure adequate consultation and transparency.</p> <p>Consultation/stakeholder Engagement is carried out throughout project life cycle.</p> <p>For meaningful consultations, the Borrower provides relevant project documents in a timely manner prior to consultation in a form and language that are understandable and accessible to the group being consulted.</p> <p>Minutes of the public meetings are included in the ESIA/ESMP reports.</p>	<p>Public Participation is a structured meeting, called in accordance with Section 7, during which the public who are likely to be affected by the proposed activity are given the opportunity to express their opinions and concerns about the proposed activity. The public must be informed about the nature of the project, its benefits, and dis-benefits so they can be empowered to make informed comment.</p> <p>In designing the consultation plan, the applicant should consider relevant methods for consulting different stakeholders including the following:</p> <ul style="list-style-type: none"> • Questionnaire, polls and surveys; to determine public attitudes and perceptions on various issues. • Advertisement; public notices describing the details of the project and issues involved placed at accessible locations. • Mass media; use of newspapers, TV and Radio coverage to reach a large population of the community. • Leafleting; Brochures, leaflets and information sheets distributed to the public as a quick and easy method of providing general information. • Personal Contact; direct discussions between project staff and individuals interested in the effects of the project. 	<p>Conduct ESIA consultation as per the EA Act and Regulations, taking cognizance of World Bank requirements, such as compliance to the COVID-19 protocols, during presentation of ESMP and VCP during consultation. The results from consultation will be incorporated into the ESIA/ESMP and VCP or can be submitted as an annex.</p> <p>If consultation with vulnerable communities is required, consultation with World Bank specialist will be made to ensure that the consultation is adequate.</p>

EA Process Stage	WB (Operational Principles)	Botswana Environmental Assessment Requirements	Sub-Project Proposed Gap Filling Measures
		<ul style="list-style-type: none"> • Community presentations; presentation given by the developers to specific community groups. • Workshops; Generally, most effective for discussing and identifying solutions to problems, scoping of potential impacts and creating other plans of action. • Public meetings; meetings by the developer to make a presentation describing the project and relevant issues, which is then followed by questions and answers. • Public hearing and Enquiries; more formal than public meetings. <p>Institutional stakeholder consultation is undertaken through questionnaires, and telephone interviews</p>	
Disclosure	<p>The Borrower disclose ES documents at project sites;</p> <p>The WB will disclose documentation relating to the E&S risks and impacts of high risks and substantial risks projects prior to project appraisal.</p> <p>The WB discloses environmental and social (E&S) documentation based on the Borrower's authorization. Once the World Bank officially receives the report, it will make the ESIA Report in English available to the public through the Bank external website.</p>	<p>Public Notice: A public hearing is a special meeting which allows the public to make submissions on an EIS before DEA make a final decision on its approval, rejection or deferment.</p> <p>A notice of the public hearing must be published in the mass media using the official languages for a period of not less than 10 days prior to conducting the public hearing.</p> <p>The final report is subjected to public review process as per section 10 (2) of the Act.</p> <p>The public review notification advert is placed in the government Gazette, and a newspaper circulating at least once a week for two consecutive weeks inviting written comments and or objections</p>	<p>Follow DEA Act, regulations and requirements and WB requirements.</p> <p>All ESIA/ESMPs, be publicly disclosed both in English and local languages.</p>

EA Process Stage	WB (Operational Principles)	Botswana Environmental Assessment Requirements	Sub-Project Proposed Gap Filling Measures
		from Interested and Affected Parties likely to be affected by the proposed activity. The advert should be written in both English and Setswana.	
Clearance procedure	Review and clearance of E&S documents will follow upfront agreements between the Borrower and the WB. If the Bank is not satisfied that adequate capacity exists on the part of the Borrower, all High Risk, as appropriate, Substantial Risk subprojects will be subject to prior review and approval by the Bank until it is established that there is adequate capacity.	<p>Review and authorization of environmental statement is done by the DEA, after they consider it to have adequately identified and assessed anticipated impacts associated with the proposed activity.</p> <p>According to Section 14 of the EA Act, after reviewing the statement, the competent authority may;</p> <ul style="list-style-type: none"> a. Grant authorization to the developer with such terms and conditions as the competent authority considers necessary, where the statement sufficiently identifies the environmental impacts emanating from the project and mitigation measures to ameliorate those impacts, with such terms and conditions as the competent authority considers necessary; or b. Request for additional information, where the statement is deemed not to sufficiently identify the environmental impacts emanating from the project and mitigation measures to ameliorate those impacts; or c. Reject the statement, where the developer fails to satisfy the conditions of (b) above 	<p>The sub-project will be approved by the DEA if it meets the prescribed criteria.</p> <p>World Bank's review and clearance of the ESIA/ESMP will be required before implementation of the sub-project</p>
ESIA Supervision	During project implementation, ensuring compliance is the responsibilities of the Borrowers. Borrowers shall carry out	During project implementation, ensuring compliance is the	Follow the approved ESMP/ESIA of the Sub-

EA Process Stage	WB (Operational Principles)	Botswana Environmental Assessment Requirements	Sub-Project Proposed Gap Filling Measures
	<p>E&S requirements and monitoring E&S compliance in accordance with project legal agreement (including the ESCP) and providing regular monitoring report to the Bank.</p> <p>The WB carry out E&S monitoring proportionately to the potential E&S risks and impacts. The Bank carry out regular implementation support mission including E&S implementation monitoring. The E&S monitoring and reporting is based on provisions and arrangement specified in the loan agreement and described in the other project documentation, to determine whether the Borrower's compliance with environmental covenant (primarily with EMP) is satisfactory.</p> <p>Based on the result of monitoring, any corrective and preventive actions will be identified and incorporated into an amended ESCP in a manner acceptable to the Bank. The Borrower will implement, monitor, and report on these actions following the amended ESCP.</p>	<p>responsibilities of the Developer.</p> <p>Procedures (steps) in designing a monitoring programme:</p> <ul style="list-style-type: none"> • Identify the scope of the monitoring and the aspects such as water quality, disease vectors and social dislocation that require monitoring • Define the objectives for the monitoring of each of these aspects. • Define the boundaries and select maps and plans, and sites of observation, measurement and sampling. • Select key indicators for direct measurement or observation. • Define how the data will be analyzed and how the analysis will be presented. • Make decisions on the level of accuracy required in the data. Set the minimum requirements for monitoring air, water, soil, and noise. • A monthly monitoring report should be submitted to DEA for review. 	<p>Projects and monitor accordingly.</p>

3.6.2 World Bank's Environmental, Health and Safety (EHS) Guidelines for Water and Sanitation

The EHS Guidelines for Water and Sanitation include information relevant to amongst others the operation and maintenance of the potable water distribution systems. Environmental issues associated with water and sanitation projects may principally occur during the construction and operational phases, depending on project-specific characteristics and components.

Traditional sources for potable water treatment include surface water from lakes, streams, rivers, etc. and groundwater resources. Where surface or groundwater of adequate quality is unavailable, other sources of water including seawater, brackish water, etc. may be used to produce potable water. Development of water resources often involves balancing competing qualitative and quantitative human needs with the rest of the environment. This is a particularly challenging issue in the absence of a clear allocation of water rights which should be resolved with the participation of appropriate parties in advance of project design and implementation.

Recommended measures to prevent, minimize, and control environmental impacts associated with water withdrawal and to protect water quality relevant to this sub-project include:

- Evaluate potential adverse effects of groundwater withdrawal, including modeling of groundwater level changes and resulting impacts to surface water flows, potential land subsidence, contaminant mobilization and saltwater intrusion. Modify extraction rates and locations as necessary to prevent unacceptable adverse current and future impacts, considering realistic future increases in demand.

Both surface water and groundwater supplies can become contaminated with potentially toxic substances of natural and anthropogenic origins, including pathogens, toxic metals (e.g., arsenic), anions (e.g., nitrate), and organic compounds. Such contamination might result from natural sources, actions or releases that are routine (e.g. discharges within permit limits), accidental (e.g. from a spill), or intentional (e.g. sabotage).

Recommended measures to protect the quality of the water supply include:

- Determine the area that contributes water to the source (e.g., watershed of a stream or recharge area for groundwater), identify potential sources of contamination with the area, and collaborate with public authorities in the implementation of management approaches to protect the source water quality, such as:
 - Zoning ordinance provisions
 - Facility inspection or hazardous material survey program
 - Information to businesses concerning applicable requirements
 - Environmental permits checklist for new businesses.
 - Strategic monitoring within area
 - Development and implementation of educational campaigns to promote best management practices that reduce the risk of water contamination
 - Incorporation of surface water protection into regional land use planning
- Evaluate the vulnerability of the water source to disruption or natural events, and implement appropriate security measures as necessary, such as:

- Continuously monitor raw water for surrogate parameters (such as pH, conductivity, total organic carbon [TOC], and toxicity)
- Inspect sites at random times
- For reservoirs and lakes, implement a neighborhood watch program with local park staff and other community users of the reservoir/lake Equip wellheads with intrusion alarms

3.6.3 The World Bank ESF Interim Guidance on COVID-19 Version 1

Due to the COVID-19 virus pandemic, the sub-project will have mitigation measures for protection and avoidance of the spread of the virus to workers and the community. Together with suggested mitigation the contractors and other implementers will refer to ESF/Safeguards Interim Note¹⁰ and Botswana’s Emergency Powers COVID-19 Regulations (2020) – Infection Prevention and Control Measures in Workplace Guide¹¹. The Infection Prevention and Control Measures in Workplace Guide clearly articulates procedures for screening and triaging, cleaning, and sanitizing. Hand hygiene, respiratory hygiene, social distancing, and precautionary measures to consider when employees travel (Annex 16).

3.7 INSTITUTIONAL FRAMEWORK FOR PROJECT PREPARATION AND IMPLEMENTATION

Table 35 Below summarizes the government institutions/ministries and their roles/responsibilities in the sub-project to support the PIU.

Table 35: Summary Government Institutions/Ministries and Their Roles/Responsibilities in Supporting the PIU in the ESMP Implementation

Institution	Mandated Role	Role/Activities to Play in ESMP Implementation
Ministry of Land Management, Water and Sanitation Services	Policy and funding for land, water and sanitation	Funding and policy direction
Water Utilities Corporation (Project Implementation Unit)	To provide water and management of wastewater in Botswana. To appoint the Consulting Engineers, Contractor and Environmental Consultant. PIU is resourced with engineers, safeguard team, procurement and project controls.	Implementation and supervision of construction and ESMP monitoring
Consulting Engineers	To design and supervise construction of the water supply scheme	To supervise the implementation of the ESMP
The Contractor	To construct the water supply scheme components	To implement the requirements of the ESMP
Environmental Consultants	To prepare Environmental, Social and Impact Assessment study for the water supply scheme	To provide consultancy services during environmental monitoring of the construction of the water supply scheme

¹⁰ Interim Guidance On COVID-19 Version 1: April 7, 2020

¹¹ Emergency Powers (COVID-19) Regulations (2020) Infection Prevention and Control Measures in Workplace Guide: <https://covid19portal.gov.bw/covid-19-regulations>

Institution	Mandated Role	Role/Activities to Play in ESMP Implementation
Ngwato Land Board through Nata Sub-Land Board, Marapong Sub-Land Board and Tutume Sub-Land Board	Management of Tribal Land	<ul style="list-style-type: none"> - Permit/ give surface rights for contractor's camps, Labourer's Camp, water reservoir tank and reverse osmosis (RO) plant <p>If any resettlement issues arise assist in evaluating land parcels.</p>
Ministry of Nationality, Immigration and Gender Affairs	Policy and responsible for Gender Affairs, and Immigration issues	<ul style="list-style-type: none"> - Creation of a gender sensitive environment - Promotion of gender equality - Coordination and facilitating capacity building in various aspects of gender and development. <p>Promotion of the development of gender sensitive sectoral policies and procedures.</p>
Department of Environmental Affairs	Responsible for Environmental and Social Impact Assessment review and protection of the environment	Will receive monthly reports and audit the project.
Tutume Sub-District Council and Sowa Town Council	Seeks development of the district	<ul style="list-style-type: none"> - Provides oversight monitoring of environmental, social safeguards measures and overall project delivery. <p>Through S&CD will monitor that beneficiaries including the vulnerable people are employed.</p>
Department of Occupational Health and Safety	Ensures the safety and welfare of workers at the factories	Inspect sites for safety of workers and compliance with the Factories Act.
Department of Waste Management and Pollution Control	Policy making and in charge of waste management in the country	Inspect sites for waste management (land pollution, soil contamination etc.).
Department of National Museum and Monuments	Responsible for archaeology in the country (Cultural and historically sites and artefacts)	Will respond to Chance Finds and give guidance.
Botswana Police Services	Protection and prevention of Crime and Civil cases,	Maintain peace at the work sites and provide advice on crime prevention and affrays; will address crime.
Department of Labour and Home Affairs	Labour issues	<ul style="list-style-type: none"> - Provide safety awareness/education materials for workers. <p>Inspect sites periodically</p>
Department of Road Transport and Safety	Promotes road and machinery use in a safely manner	Ensure that the machinery to be used by the contractor is safe to use.
Tutume District Medical Health Teams (Medical Facilities)	Provide health education and medical services	Provide health awareness/ education materials and provide medical services to ill/sick workers.
Village Development Committees and Tribal Administration	Settlement development and local/ community governance	<ul style="list-style-type: none"> - Choose representatives for GM. <p>Monitor implementation of Safeguard measures.</p>

Institution	Mandated Role	Role/Activities to Play in ESMP Implementation
Department of Gender Affairs	The Department's responsibilities include the promotion of gender equity and the coordination and facilitation in various aspects of gender policy development.	<ul style="list-style-type: none"> - Educate and create awareness on social issues such as GBV and revitalization of aspects of San women and their rights. <p>Be part of the GM Committee.</p>

3.7.1 Ministry of Land Management, Water and Sanitation Services

The Ministry is responsible for the management of land, water and related functions as well as the facilitation of housing and water delivery. Its responsibilities entail:

1. National physical planning, which involves determination of optimal utilization and proper organisation of land space and development.
2. Administration of land and water in both the urban and rural areas which entails distributing the Land; developing policies that guide or address issues relating to access of land, tenure; title registration; land values; compensation; conflict resolution and compliance with covenants as well as ensuring availability of administrative and physical infrastructure and procedures.
3. Provision of services and information on cadastral surveying, mapping and remote sensing that lay the foundation for physical planning; land administration and development
4. Provision of service infrastructure to facilitate land development
5. Facilitation of the housing delivery involves coordinating and promoting the implementation of the National Housing Policy, which aims at ensuring that every citizen is decently housed.
6. Availing land for residential development; providing funding for development of housing for the low income groups; encouraging financial institutions to finance housing development; exploring innovative building technologies; partnering with the private sector to provide housing for Government employees, encouraging employees to have housing packages for their respective employees.
7. Promoting efficiency in the execution of the mandate and delivery of services to the public through information management and re-engineering processes.

The Ministry has the overall responsibility for the implementation of the sub-project, on behalf of the Borrower, it will do so through the established Coordinating Unit which will have overall responsibility for coordination of Project activities, and consolidation of monitoring, reporting for the project. This will include preparation of a consolidated work plan, procurement plan, monitoring reports, financial reports, and other reports required for the sub-project.

3.7.2 Water Utilities Corporation (WUC)

The Corporation's mandate is to supply potable water to all urban centres and settlements in the country, as well as managing wastewater under the Water Sector Reforms Programme (WSRP) instituted in 2009. The Corporation's mission is to provide sustainable water and wastewater management services in a cost-effective and environmentally friendly manner to the economy.

WUC is responsible for the implementation of all sub-projects under Components 1 and 2, which largely involve rehabilitation and augmentation of existing water and wastewater systems currently managed by WUC. In addition, it will be responsible for a subset of the institutional and capacity

building activities under Component 3. Under WUC there is also a unit responsible for project supervision and implementation, Project Implementing Unit (PIU). PIU consists of Project Sponsor, Project Coordinator, Project Management Team, Safeguards team and Technical team (Project Manager and Engineers).

3.7.3 Department of Roads

The Roads Department within the Ministry of Transport and Communications is responsible for developing and maintaining the country's road network. The department manages all the primary and secondary roads in the country. The roads have various servitudes or reserves depending on their level of service. The road reserves may vary from 61 m to about 30 m wide. It is designed (according to the urban design standard of Botswana) that infrastructure such as water pipes are laid within the road reserve to service places of need.

Roads Department, therefore, plays a role as an institution to permit the laying of water pipes within its reserves, and thrust boring along both primary and secondary roads following an application for a wayleave and submission of method statements.

3.7.4 Department of Lands

The main purpose of the Department is to administer state land through the State Land Act, to regulate freehold land through Land Control Act and provide professional and technical advice on tribal land matters. The Department has four technical divisions that carry out its functions. The four divisions are Administration, Estates and Land Valuation, Land Inventory and Management, Land Use and Development.

The Department validates or approves all compensation values before they are paid out. It is also responsible for transferring land rights within Tribal Land. The Sub-project villages fall under tribal Land. Numerous sites will be applied for; for the construction of site camp, a water reservoir, elevated tanks and pump stations.

3.7.5 The Land Board(s)

The Land Board derives its statutory responsibilities to hold land in trust for the citizens of Botswana from the Tribal Land Act of 1968. The functions of the Land Board involve granting rights to use land, cancellation of the grant of any rights to use any land, imposition of restrictions on the use of tribal land, authorizing any transfer of tribal land and hearing appeals from decisions of Subordinate Land Board in respect of any of its functions conferred on such Sub-Land Boards. The granting and repossession of tribal land are carried out through the land board and in accordance with the provisions of the Tribal Land Act (1968). Ngwato Land Board through the Tutume and Nata Sub-Land Boards will be in charge of land allocation and rights for camp sites, pump stations and storage tanks.

3.7.6 Land Tribunal

The Tribal Land Act was amended in 1993 to provide for the establishment of a specialized court to attend to appeals against the decisions of the Land Boards and for enforcement of the Land Board decisions. The Land Tribunal's official commencement date was the 13th October 1997. Section 40 of the Tribal Land (Amendment) Act of 1993 provides for the establishment of the Land Tribunal to assume the responsibility of the Minister in adjudicating on appeals. Any party who is aggrieved by the decision of the Land Tribunal may appeal to the High Court on a point of law only.

The Land Tribunal is a three-member team chaired by a president. The president of the Tribunal is a qualified lawyer appointed in accordance with the provisions of the Public Service Act. The members are also appointed in terms of Public Service Act, on contract terms renewable for two terms. The Tribunal is also empowered to add two advisory members to assist, but not participate in decision making, in any matter before it that involves local cultural or traditional aspects or values.

The Land Tribunal is to mediate between the project proponent and the person that is aggrieved pertaining to land issues that concerns the project. The Land Tribunal is the last stage in the GM for resolution of land conflicts in the sub-project.

3.7.7 Department of Environmental Affairs

The Department of Environmental Affairs (DEA) within the Ministry of Environment, Natural Resources Conservation and Tourism is responsible for protection and improvement of the quality and safety of the environment, to promote conservation and sustainable use of natural resources.

The Department is also responsible for receiving and reviewing of Environmental Impact Statements on environmental and social impacts of plans, programmes and projects. DEA will be responsible to ensure that mitigation measures for adverse environmental impacts are adequately implemented. This would ensure through auditing of the project and receiving periodic monitoring reports.

3.7.8 Sowa Town Council and Tutume Sub District Council

The duty of the Council is to exercise good governance and take responsibility for development in their areas of jurisdiction. Councils in Botswana are corporate bodies with distinct names by which they are established. In terms of Section 31 of Local Government (District Councils) Act and Regulation 32 of the Townships Act, Councils are to:

- Provide primary schools and other educational services in relation to primary education.
- Provide sanitary services for the removal and disposal of refuse.
- Safeguard and promote public health and prevent the occurrence of any outbreak or prevalence of any disease.
- Construct and maintain public roads and streets other than those constructed and maintained by the central Government.
- Act as fire authorities to maintain fire brigades and to be responsible for the extinguishing of fires and protect life and property in case of fire
- Control urban building design and standards
- Organize the collection, retention and where applicable, sale of lost cattle's (Matimela)
- Establish, maintain and control markets.

Both Councils have Roads Departments that are responsible for roads at the district level. Normally the roads are of tertiary levels as they are within the cities, towns or settlements. The road reserves vary between 45 m to as low as 15 m. As most of the settlements are not planned or existed before plans were made most of the road reserves have been encroached upon. The councils are also to permit the use of their road reserves.

Both Councils also have the Departments of Environmental Health. The core business of the department includes the management of waste and inspection of factories.

The mandate of department which is to regulate health, safety and welfare of employees, and the safety of machines and plant, will be executed throughout all the locations that are affected by the

Water Supply Scheme. The Councils have a Social and Community Development Department which addresses social issues including taking care of vulnerable people in the society.

3.7.9 Department of Occupational Health and Safety

The core business of the Department of Occupational Health and Safety includes providing overview of factory building plans for suitability of designs, registration of factories, inspection of factories and other places of work such as building operations and works of engineering construction; registration and inspection of plant and machinery e.g., passenger lifts, boilers, air receivers, cranes and lifting tackle etc. and legal action where there is a contravention of the law. The Department also disseminates information on occupational health and safety, and it participates in the drawing-up of Botswana National health and safety standards.

The mandate of the Department is to regulate health, safety and welfare of employees, and the safety of machines and plant. This mandate will be executed throughout the sub-project through regular inspections of the construction site by the Department.

3.7.10 Department of Waste Management and Pollution Control

The Department of Waste Management and Pollution Control (DWMPC) is mandated to prevent and control pollution of the environment through the formulation of waste management policies, regulating and monitoring of the waste sector. The sub-project will ensure compliance with the following policy and acts; Waste Management Act (1988), Wastewater Sanitation Policy (2001), Air Pollution Preventative Act (1971), Botswana National Master Plan for Wastewater and Sanitation (2003), Botswana Strategy for Waste Management (1998), Wastewater Discharge Standard BOS 93:2012 and the Ambient Air Quality Standard.

DWMPC will monitor waste management and pollution at the construction site; this will include the control and regulation of remediation of contaminated soil.

3.7.11 Department of National Museum and Monuments

The mandate of Department of National Museum and Monuments (DNMM) is to promote, conserve, and protect Botswana's heritage. Archaeological Impact Assessment with its mitigation measures for the sub-project will be reviewed by the DNMM. The AIA mitigation measures will be put in place to ensure the sustainability of this department's mandate.

The Department is to monitor the recommendations it has made in terms of archaeology for the project and would provide guidance during a Chance Find.

3.7.12 Botswana Police Services

The Botswana Police Service operates throughout the country and within the project area. They are mandated to protect life and property, prevent, and detect crime, repress internal disturbances, maintain security and public tranquillity, apprehend offenders, bring offenders to justice, duly enforce all written laws with which it is directly charged and generally maintain the peace.

The Sowa Water Supply Scheme will depend on the police services to protect life and prevent crime and maintain security during the implementation of the sub-project. Police stations are located in Sowa Town and Nata, while in other settlements they are located in Kgotla areas.

3.7.13 Department of Labour and Home Affairs

The mandate of the Department of Labour and Home Affairs is to promote gender equality, provide labour, occupational health and safety, civil registration, migration, citizenship and coordinate vocational training.

This Department will handle all labour issues or conflicts between employer and employees throughout the implementation of the project.

3.7.14 Department of Road Transport and Safety

The mandate of the Department of Road Transport and Safety is to provide effective, efficient, reliable, affordable, and sustainable safe road transport services which will meet the community, economic and environmental needs of Botswana. All vehicles and machinery which are to be used during construction of the project will be inspected for roadworthiness by this department.

3.7.15 Central District Medical Health Teams (Medical Facilities)

During the implementation of the project, the mandate of the Medical Health Team within the project beneficiaries (Medical Facilities) will be to:

- Provide initial medical attention to all prospective employees, prior to employment
- Monitor the health of employees and advice on their fitness to perform their work
- Contribute to the protection of the health of persons present on site
- Provide emergency medical responses
- Assist in prevention and detection of occupational accidents and illnesses
- Assist in the prevention of work-related psychological problems
- Provide monthly education for HIV/AIDs and other diseases
- Provide condoms for the workers at the project site.

3.7.16 Settlement Development Committee and Tribal Administration

The host communities and beneficiary villages are to help shape the project, by providing adequate information on the prevailing socio-economic and environmental conditions of their settlements. They are also to assist in finding the affected PAPs, through their land overseers.

3.7.17 List of Permits/Approvals/Licence/Clearance Needed for Project Implementation and Institutions Responsible

The following permits, approvals, licences, and clearances as indicated in **Table 36** are to be obtained from institutions responsible prior to the project implementation:

Table 36: List of Permits, Approvals, Licenses and Clearances

Permit/Approval/Licence/Clearance Type	Issuing Authority
Approval for civil works to commence	World Bank
Clearance for Archaeological Impact Assessment	Department of National Museum and Monuments (DNMM)
Clearance for Environmental and Social Impact Assessment	Department of Environmental Affairs (DEA) and the World Bank

Permit/Approval/Licence/Clearance Type	Issuing Authority
Clearance for felling of trees	Department of Forestry and Range Resources
Wayleave to cross the national roads and use their reserves	Roads Department
Abstraction of water from boreholes and rivers and working within rivers	Water Apportionment Board (DWA)
Water from main reticulation system	Water Utilities Corporation (WUC)
Transport and machinery permits/road worthiness	Department of Road Transport and Safety
Mining License for Borrow Pit	Department of Mines
Blasting	Botswana Police Department of Mines Respective Tribal Administration Respective Council: Sowa Town Council, Tutume Sub District Council and Serowe Administrative Authority
Land Rights for expropriation, servitudes, camp site and acquisition	Nata Sub Land Board, Marapong Sub Land Board and Tutume Sub Land Board
Waste Disposal	Departments of Environmental Health of Sowa Town Council, Tutume Sub District Council, and Serowe Administrative Authority

4 . B A S E L I N E E N V I R O N M E N T

This chapter describes the biophysical and environmental aspect of the sub-project area. Baseline data is collected to serve two purposes in the ESIA study. First, it helps us understand the current conditions

of the area and how the sub-project needs to be implemented with due consideration to the environment. Importantly, it is key elements in the environmental impact assessment process of the sub-project.

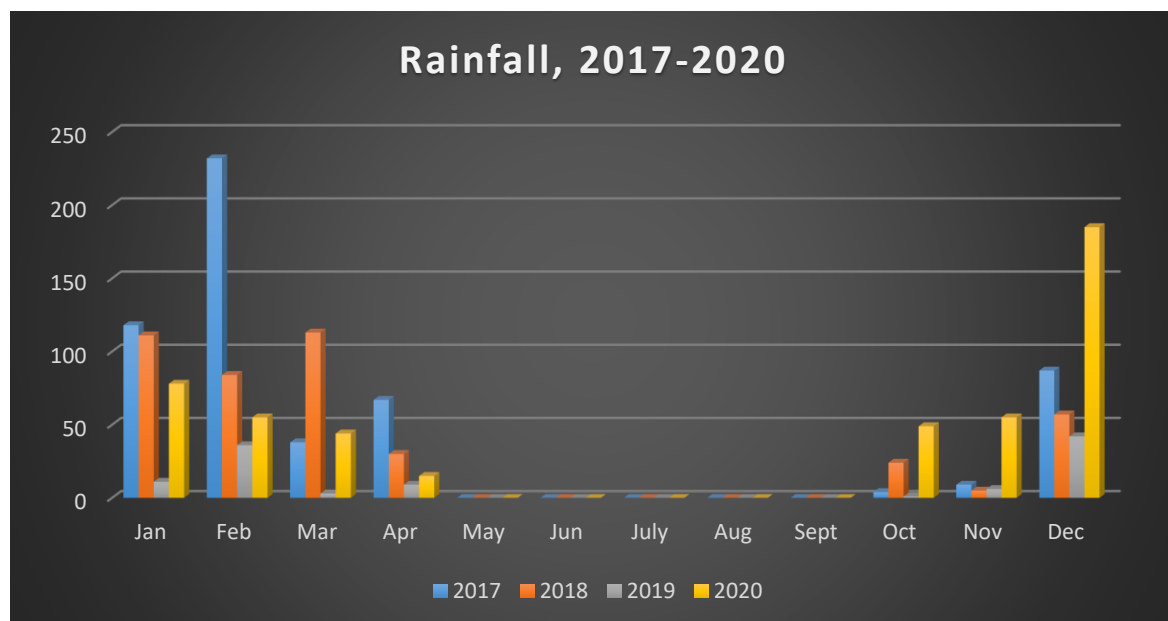
4.1 Climate

The climate of the project area is classified as semi-arid, of the low altitude, hot steppe type with summer rainfall. A characteristic of the climate is the unpredictability of rainfall and the extreme temperature variations that can occur between day and night in winter.

Temperatures are highest during summer, from September through to March. Average monthly maximum temperature ranges from 23°C to 36°C and 24°C to 28°C in winter. Average monthly minimum temperature ranges from 2°C to 25°C in winter. On average the hottest months are October and November; however, the daily maximum temperature can reach above 40°C because of high insolation and dry conditions. The coldest months are June and July; during winter months (May to August), night-time minimum temperature regularly drop to near freezing or below due to low humidity. The rainfall season runs from October to March with April as a transition month from summer to winter. The mean annual rainfall is 524 mm. Most rain occurs in the months of October to April with January as the peak rainfall month (Climate Information report 2010, Meteorological Services).

4.1.1 Rainfall

According to the Meteorological Services Annual Rainfall report, 2017-2020, the wettest months during this period were February and December; with the highest monthly total rainfall of 230 mm recorded in February (**Figure 4**). These months fall within the rainy season of Botswana, which starts in October and ends in March.

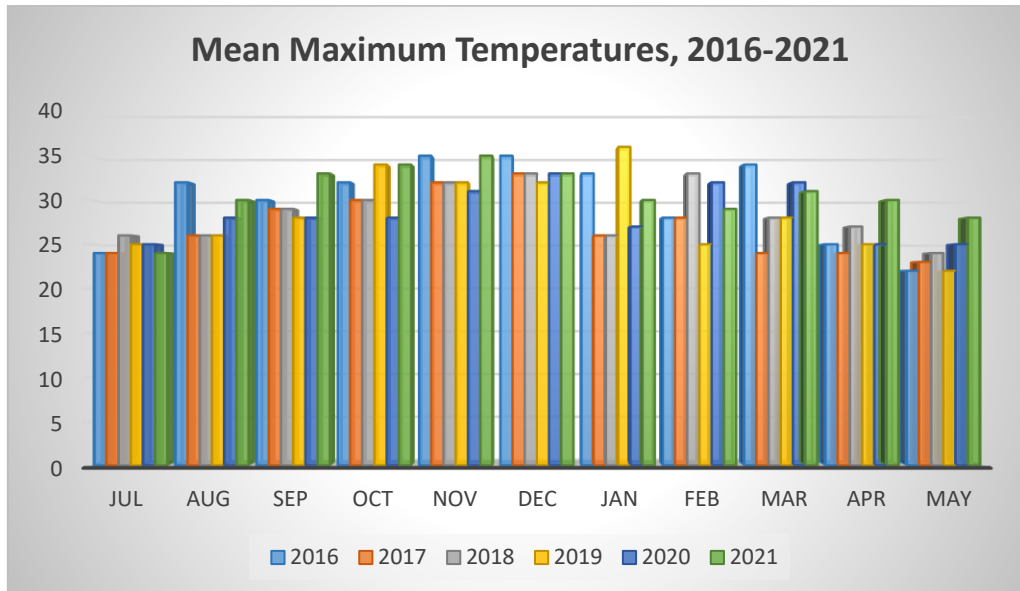


Source: Meteorological Services Annual Rainfall Report, 2020

Figure 4: Rainfall for the Sub-Project Area, 2017-2020

4.1.2 Temperature

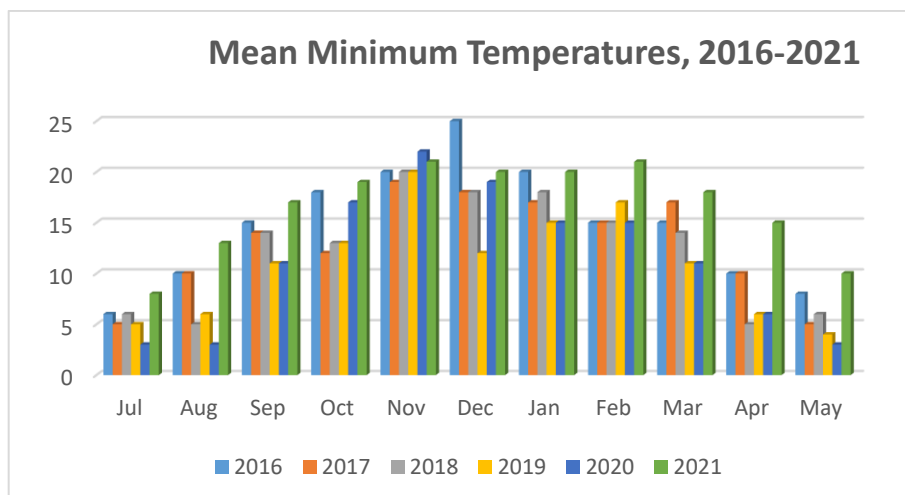
Mean maximum temperatures range between 23°C and 36°C. The hottest months start from October to January with January being the hottest at maximum temperature of 35°C (**Figure 5**).



Source: Meteorological Services Annual Temperature Report, 2021

Figure 5: Maximum Temperatures in Project Area, 2016-2021

Mean minimum temperatures range between 2°C and 25°C. May and July are the coldest months, the warm months start from September and continue to March, with December being the warmest (**Figure 6**).

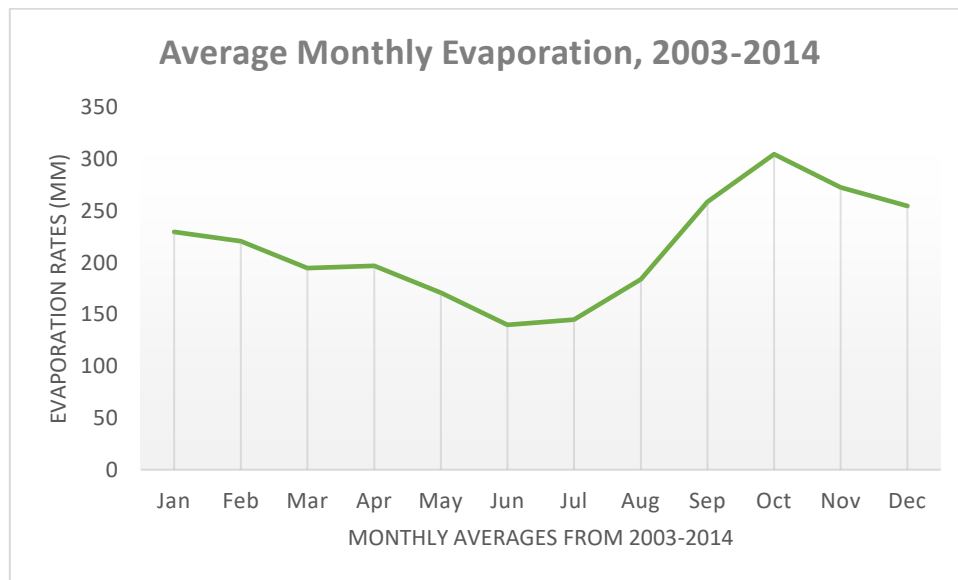


Source: Meteorological Services Annual Temperature Report, 2021

Figure 6: Minimum Temperatures for the Project Area, 2016-2021

4.1.3 Evaporation

The annual average evaporation rate for the sub-project area recorded from the years 2003-2014 is 215mm. According to **Figure 7**, during the winter months evaporation is low, and during the summer months evaporation is high. Evaporation rates decrease from February to June, and increase from July to October. The highest evaporation recorded was in October; 305mm, and the lowest was recorded in June; 140mm.

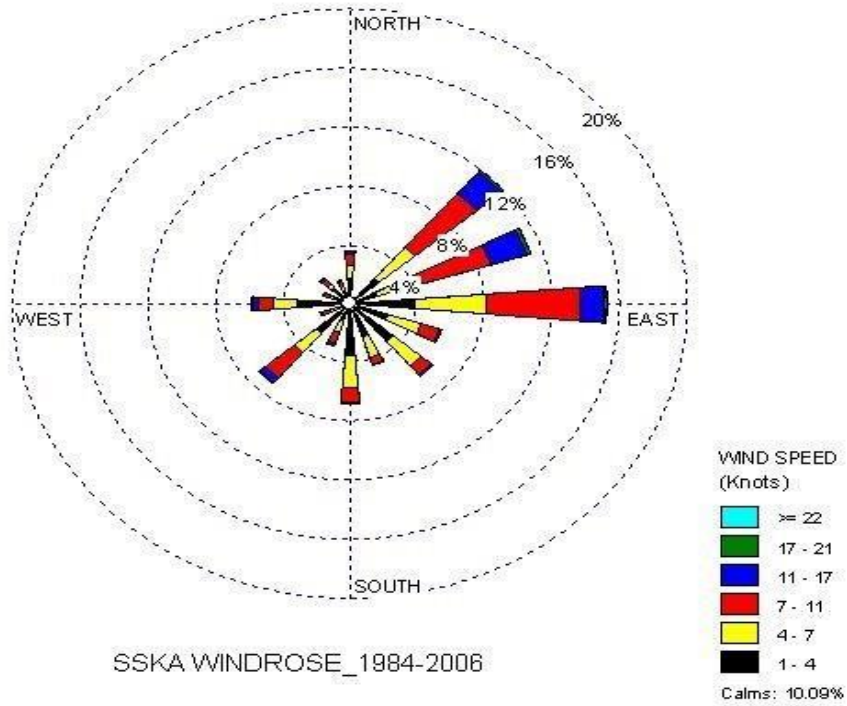


Source: BotAsh Evaporation Recordings 2003-2014

Figure 7: Average Monthly Evaporation Rates, 2003 - 2014

4.1.4 Wind

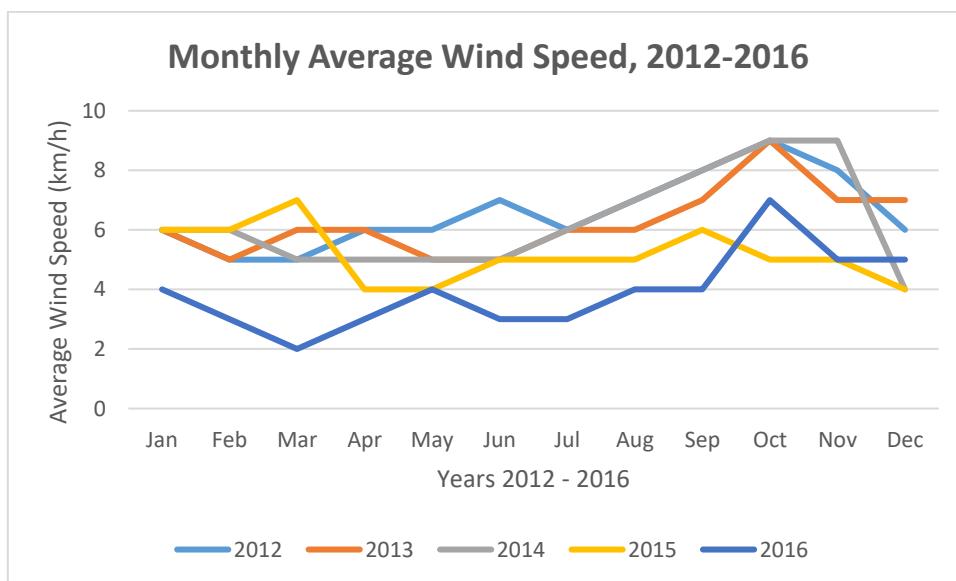
According to the Sir Seretse Khama (SSKA) Windrose below winds in the sub project area are predominantly north-easterly. The maximum wind speed ranges between 11 and 21 knots. The north easterly winds of speed range 11-17 knots followed by 7-11 knots are predominant in the area (moderate to fresh breeze). The wind speed of 7-11 knots is frequenting the north easterly direction more than other directions as depicted by the long red bars in **Figure 8**.



Source: Department of Meteorological Services 2021

Figure 8: Wind Direction and Speed, 1984-2006

Figure 9 presents monthly average wind speed from 2012 to 2016. Maximum wind speed ranges between 6 and 9 km/h (light breeze). Wind speeds were at peak in October during the years 2012, 2013, 2014, and in the month of November 2014. Minimum wind speeds were experienced in the months of March and February of the year 2016 with 3 and 2 km/h (light air).



Source: Meteorological Services, Wind speed report 2012-2016

Figure 9: Monthly Average Wind Speed, 2012 - 2016

Air Quality in the Project Area

An assessment of the economic and industrial activities in the study area suggests that dust (particulate matter - PM), are the most likely environment aspect to impact the air-quality of the area. Other aspects such as Nitrogen Oxides (NOx) and Sulphur Dioxide (SO₂) are highly unlikely to have impact due to the absence of significant sources of this aspect.

An Aeroqual Series 500 Monitor (S-500), and AEROCET-531S were used to measure suspended solids in the air (ambient PM).The exercise was carried out from 27 June to 1 July 2019 during the Makgadikgadi Epic event.

The average Particulate Matter (PM₁₀) was 52.2µg/m³, air quality levels are within allowable BOS 498:2012. Limit values for common air pollutants which cite a value of 200/µgm³.

The construction activities of the project are unlikely to significantly increase the motor vehicle traffic in the project area, and as such PM and NOx levels will not be significantly altered from baseline conditions.The graphs below shows Makgadi kgadi Epic Centre PM₁₀/Dust monitoring, NOx and SO₂ averages for the months of June and July 2019.

As depicted by the **Figure 10**, high maximum PM₁₀/Dust Monitoring averages were recorded on the 28th June followed by 29th June. The lowest minimum averages were recorded on the 28th and 30th June.

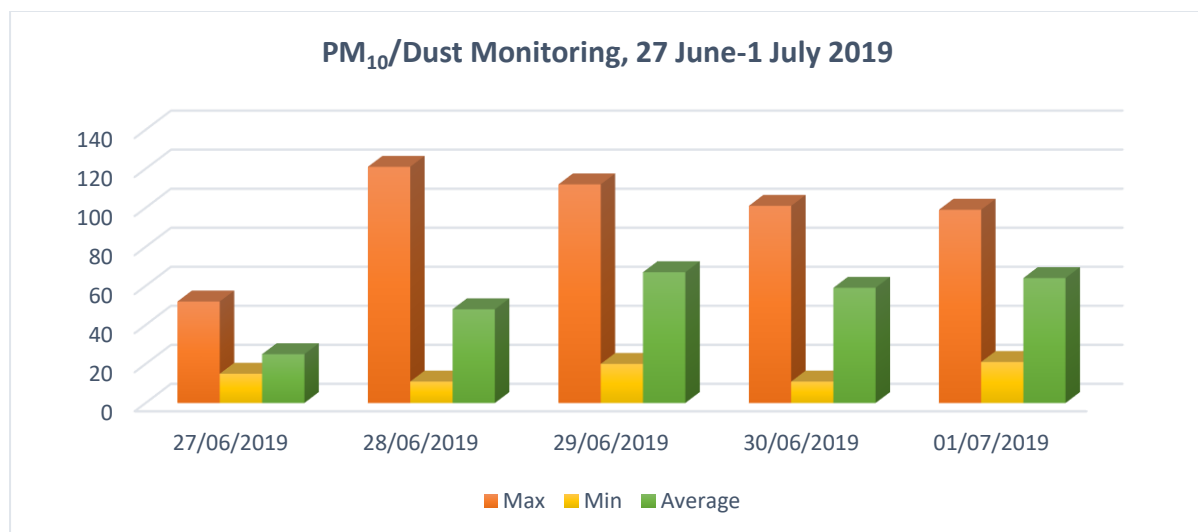


Figure 10: PM₁₀ Dust Monitoring for Makgadikgadi

Figure 11 shows the averages of NOx of Makgadikgadi Epic Centre. The averages are equal across all the days of the exercise; 9 µg/m³ which is lower than the permitted hourly average of 200 µg/m³ according to the BOS 498:2012 Ambient Air Quality –Limits for Common Pollutants.

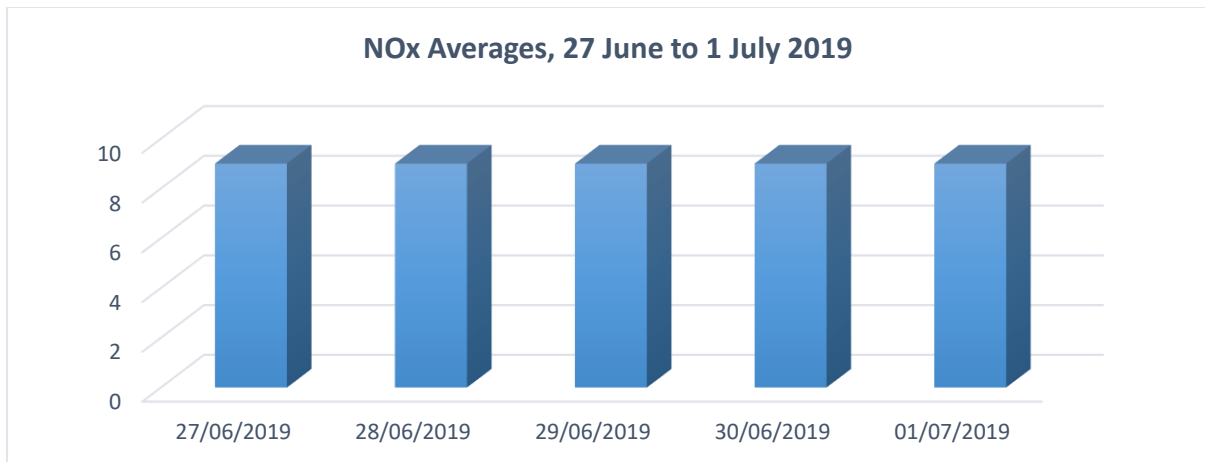


Figure 11: NOx Averages for Makgadikgadi Epic

SO₂ averages ranges from 23 to 32 µg/m³ from 27 June to 1 July 2019 (Figure 12). The 27th had the highest average, 32 µg/m³ compared to 28 June to the 1st July 2019. All the recorded figures were below the permitted hourly average limit of 350 µg/m³ as per the BOS 498:2012 Ambient Air Quality-Limits for Common Pollutants.

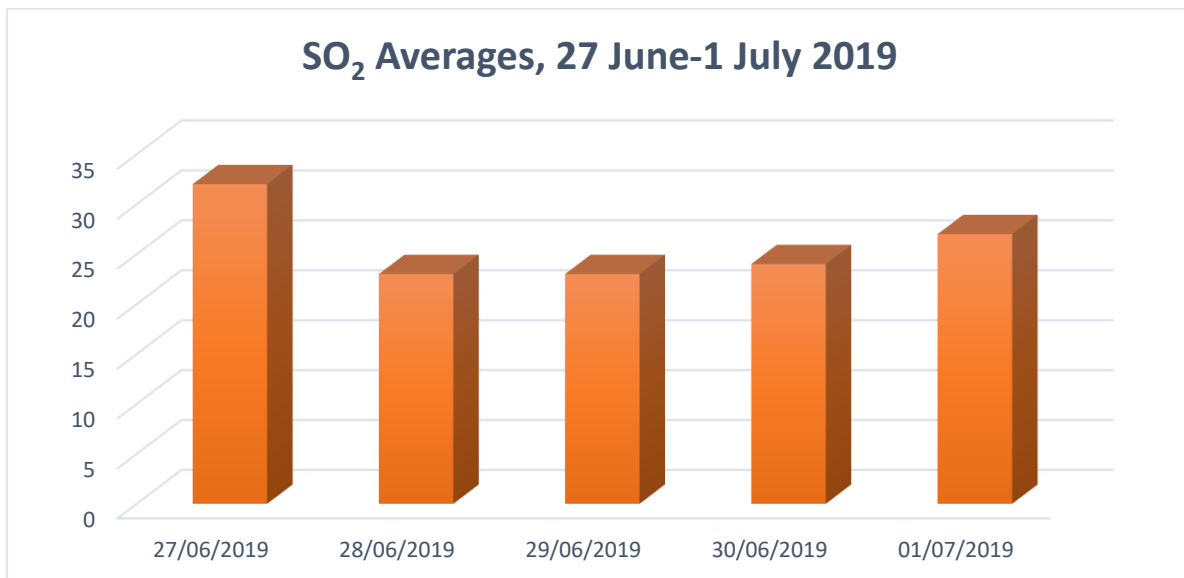


Figure 12: SO₂ Averages for Makgadikgadi Epic

The daily recorded concentration of daily common air pollutants for the project area were acceptable and below the limit values for BOS 498:2012 (Table 37).

Table 37: Makgadikgadi Epic Air Quality

Pollutant	Limit Value BOS 498:2012	Averaging Period	Concentration of Pollutant

Sulphur Dioxide (SO ₂)	350 µg/m ³	1 hour	32 µg/m ³
Nitrogen Dioxide (NO ₂)	200 µg/m ³	1 hour	9 µg/m ³
Carbon Monoxide (CO)	30 000 µg/m ³	1 hour	-
Particulate Matter (PM ₁₀)	200 µg/ m ³	Monthly	52.2µg/m ³
Ozone (O ₃) ^b	120 µg/ m ³	8 hours	-
Lead (Pb)	0.5 µg/ m ³	1 year	-
Benzene (C ₆ H ₆)	5 µg/ m ³	1 year	-

4.1.5 Noise

Case study of Makgadikgadi Epic Noise study Conducted by Fikifeather (Pty) LTD was used as a baseline information for noise study on the project area. The project lies within the periphery of Makgadikgadi epic hence the use of data collected from the event is more relevant and can be adopted. Six major pointers were picked from the study;

- Noise levels from before any activity
- Noise from generator powering light tower
- Noise from generator powering the music system
- Noise from generator powering mobile kitchen
- Noise from ambient music
- Noise from the start/end of quad bike track

Survey Instrumentation and Settings

In all cases the sound level metres (SLM) were mounted on a tripod 1.5 m above the ground level and at least 3.5 m away from any sound reflecting objects, so as to achieve Free-field Conditions.

A wind shield was placed on the microphone to reduce any wind interference during measurements. The sound meter was orientated towards the noise sources for all measurements and the area in between the sound level metre and the noise source was free from any obstacles. The measurements were taken using a SVAN 977 sound meter (Class 1, with data loggers).

The noise meters were programmed using the Sound Level Meter 2.1.7 software to collect the following variables;

- Start time of recording period
- End time of recording period
- Average sound level (Leq) over the period
- Lmin (The lowest noise level measured during the assessment); and,
- Lmax (The highest noise level measured during the assessment)

In all measurements, the following settings were used:

- The noise meters were set to the FAST response time
- Sampling time was 0.10 seconds for all events, and,
- A-Weighted Sound Pressure Level was used.

Data Analysis

The primary objective of the assignment was to:

- i) Establish the baseline data prior to commencement of the event;
- ii) Monitor ambient noise levels in accordance with the Botswana Bureau of Standards (BOBS) Standard: BOS 575:2013 maximum permissible limits for environmental noise;
- iii) Provide sound and noise level meters for class 1 sound level monitoring and comprehensive data analysis.

In view of the above, the primary data analysis objectives sought to:

- 1) Record the average, maximum and minimum noise levels of the ambient baseline noise prior to the event, in this case being noise levels as measured at the performance area on Wednesday 10 July 2019.
- 2) Record the average, maximum and minimum noise levels for the various activities anticipated to cause noise pollution, with an emphasis on activities happening at the locations.
- 3) Once the average, maximum and minimum noise levels at the various locations were known, they were compared with the BOBS 575:2013 for Maximum permissible noise levels in Botswana for specific environments and Maximum permissible continuous and/intermittent noise exposure levels.

The field-measured average, maximum and minimum noise levels were compared with the BOBS 575:2013 either:

- a) Graphically by mapping trends in the sound levels at a specified location and comparing with stated threshold, or
- b) Numerically by contrasting field-based measures with stated thresholds.

Meteorological Conditions

Measurements were carried out on calm days of similar temperature, humidity, wind speed and wind direction, and so no bias due to weather variables is expected within the findings. Temperatures were within the range permitting the sound level meters to operate optimally e.g. the manufacturers indicate that the sound level meters can operate within the temperature range of -10°C to 50°C. According to data from the on-site weather monitoring station set-up up by the event organisers, the wind speed and directions was ranging from 4 to 8 knots with a North to South west direction.

Findings and Results

1. Baseline noise prior to start of activities at the performance stage

As a bench-mark, the Fikifeather (Pty) Ltd measured noise level at the location of the performance stage (site 1) on Wednesday 10 July 2019, which data was to be used as baseline ambient night noise levels (i.e. the time-period 2000 hrs to 0600 hrs). Prior to the event, the residual noise levels at the location of the performance stage at night averaged 39.9 dBA (Leq), which was slightly higher than the 35 dBA (Leq) set as the maximum permissible noise for “*Any building used as a hospital, home for the aged, learning institutions, conference rooms, public library, and environmental and outdoor recreational site*” during the night (i.e. 2000 to 0600 hrs). This suggests that the BotAsh Mine Lease Area and project area in general have a rather high background noise at night.

Table 38: Baseline Noise prior to activities

Variable	Field measure
Start Time	2019-07-10 21:00:49
End Time	2019-07-10 21:35:06
Maximum noise level	48.9 dBA (Leq; at 2019-07-10 21:10:38)
Minimum noise level	37.9 dBA (Leq; at 2019-07-10 21:01:58)
Sample Rate	0.10s
Number of Data points used	8012
Average noise level	39.9 dBA (Leq)

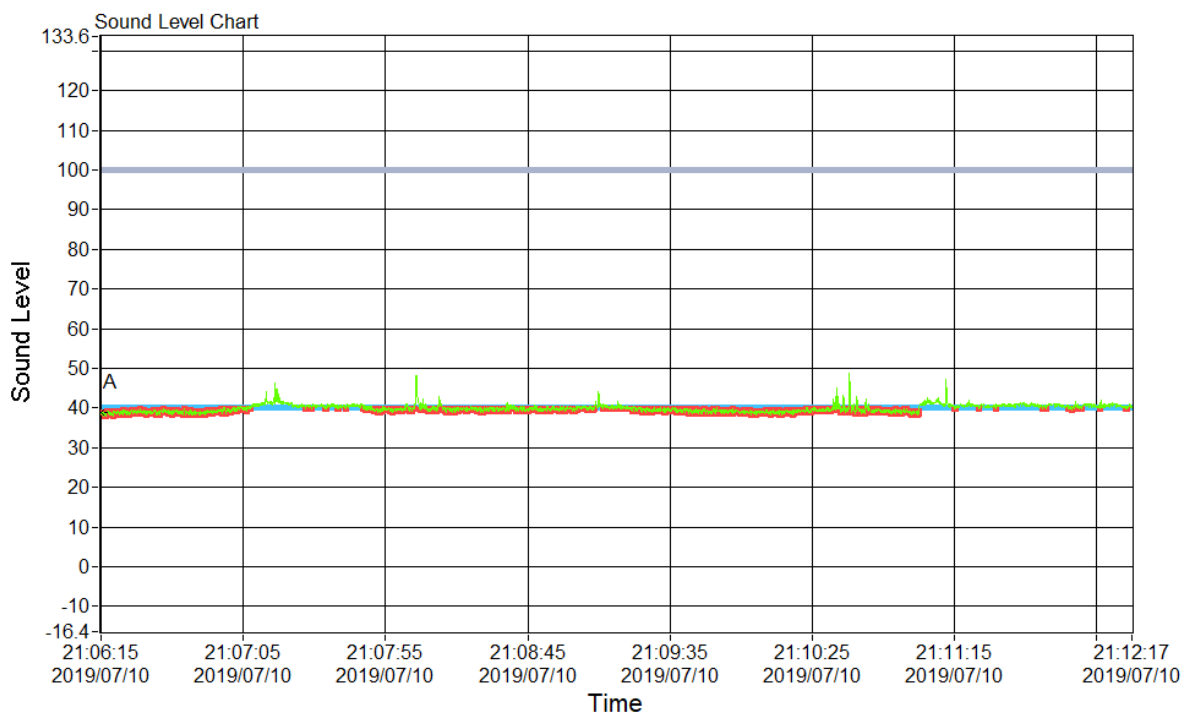


Figure 13: Part of the temporal trends in the baseline night time (i.e. 8 pm to 6 am) noise level as measured at the location of the performance stage (site 1) on Wednesday July 2019

2. Baseline Noise during Activities; Noise levels at the various events and locations

a) RentQuip Generator powering the music system and ‘Lapa’

The noise from this RentQuip generator located at site 3 averaged 71.6 dBA (Leq), which was well within the BOBS standards for continuous noise exposure levels, wherein the least maximum permissible noise exposure level was 85 dBA (Table 39).

Table 39: Noise measurements from the generator powering music

Variable	Field measure
----------	---------------

Start Time	2019-07-13 04:58:26
End Time	2019-07-13 05:01:06
Maximum noise level	72.8 dBA (Leq; at 2019-07-13 04:59:02)
Minimum noise level	70.0 dBA (Leq; at 2019-07-13 05:00:04)
Sample Rate	0.10s
Number of Data points used	1596
Average noise level	71.6 dBA (Leq)

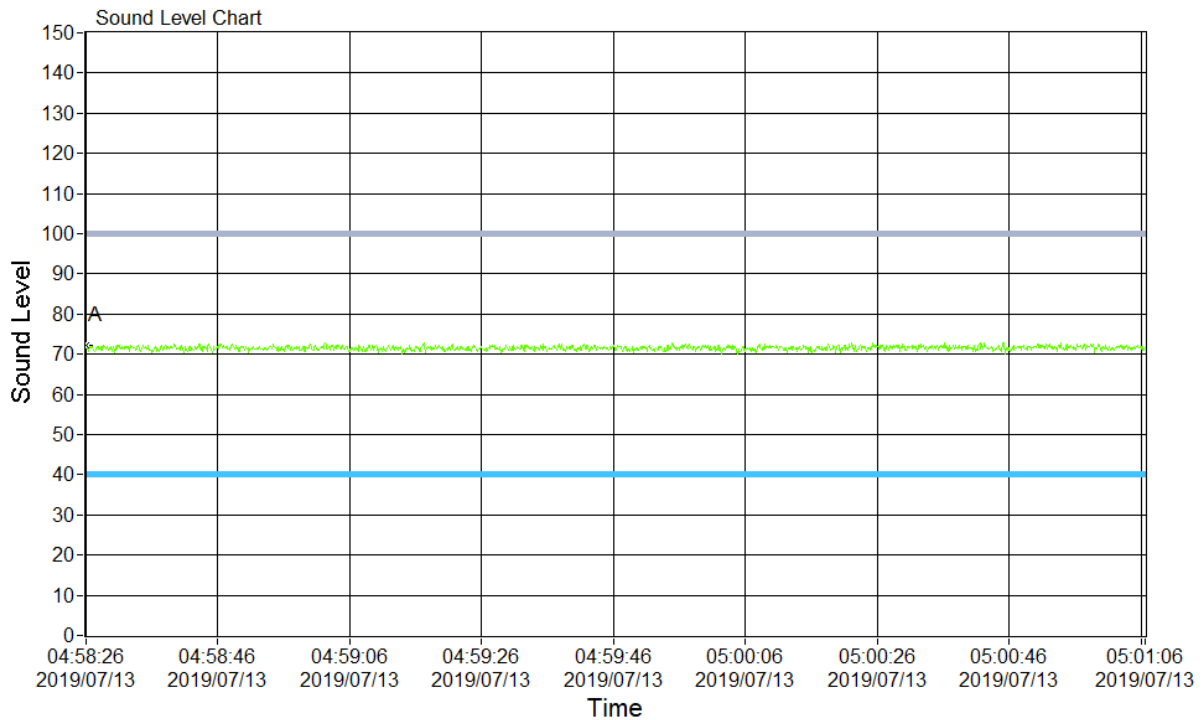


Figure 14: Temporal trends in the noise level around the RentQuip generator that supplied power to the music system and the ‘Lapa’ (site 3) on the early morning of Saturday 13 July 2019

b). Sunlight Engineering Services Generator powering the light tower placed at the spectator zone

The noise from this Sunlight Engineering Services generator located at site 4 averaged 70.7 dBA (Leq), within the 85 dBA (Leq) threshold for continuous noise exposure levels (Table 40).

Table 40: Noise measurements from generator powering light

Variable	Field measure
Start Time	2019-07-13 04:36:48
End Time	2019-07-13 04:38:59
Maximum noise level	71.9 dBA (Leq; at 2019-07-13 04:37:02)
Minimum noise level	70.3 dBA (Leq; at 2019-07-13 04:38:16)

Sample Rate	0.10s
Number of Data points used	1307
Average noise level	70.7 dBA (Leq)

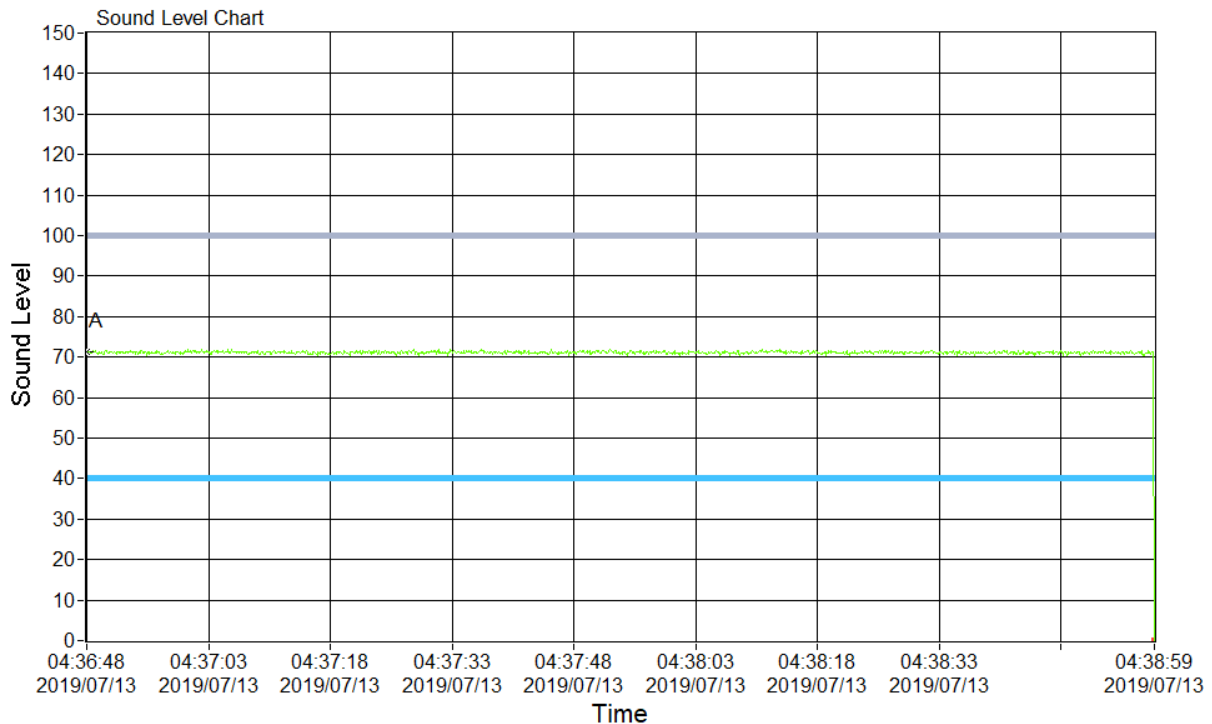


Figure 15: Temporal trends in the noise level around the Sunlight Engineering Services generator that powered the light tower at the spectator zone (site 4) on 13 July 2019

c). Generators powering catering hall and kitchen

The noise from the generator located at site 8 averaged 74.9 dBA (Leq), which was well within the BOBS standards for continuous noise exposure levels, wherein the least maximum permissible noise exposure level is 85 dBA (Table 41).

Table 41: Noise levels from generators powering hall and kitchen

Variable	Field measure
Start Time	2019-07-13 05:30:24
End Time	2019-07-13 05:33:03
Maximum noise level	75.7 dBA (Leq; at 2019-07-13 05:31:21)
Minimum noise level	73.9 dBA (Leq; at 2019-07-13 05:31:29)
Sample Rate	0.10s
Number of Data points used	1589
Average noise level	74.9 dBA (Leq)

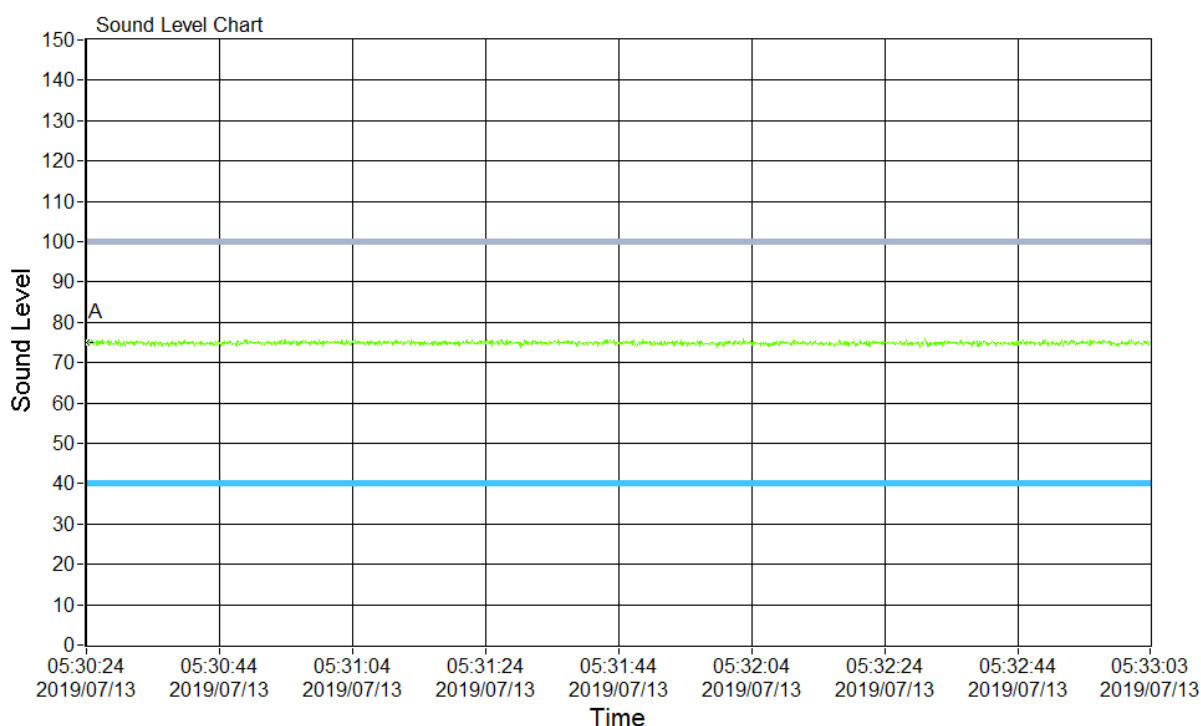


Figure 16: Temporal trends in the noise level around the generator that supplied power to the catering hall and kitchen (site 8) on 13 July 2019.

d). Noise level monitoring at the start/end position of the fun quads track

The noise from the fun quads as measured from the start/end position located at site 10 were slightly variable during the 2019 *Makgadikgadi Epic*, but overall the average noise level were always below 71 dBA (Leq) while the maximum noise level recorded was 80.3 dBA (Leq) recorded on Saturday 13 July 2019 (Table 42). Therefore, in all instances the BOBS threshold of 100 dBA (Leq) for “ceremonies, festivals and entertainment events” was never exceeded.

Table 42: Noise level monitoring at the start and end of fun quads track

Variable	Day			
	12 July 2019	13 July 2019	14 July 2019	15 July 2019
Fun quads start	0900 hrs	0900 hrs	0900 hrs	0900 hrs
End time of fun quads	1823 hrs	1827 hrs	1824 hrs	(noise monitoring ended 1200 hrs when skydivers' agenda finished)
Time when first ride recorded	1150 hrs	1035 hrs	0939 hrs	1023 hrs

Time when last ride recorded	1823 hrs	1827 hrs	1824 hrs	1157 hrs
No. rides included in analysis	22	38	54	10
Maximum noise level (dBA (Leq))	79.2	80.3	74.4	72.5
Average dBA (Leq) ± Standard Deviation	70.7 ± 4.6	68.7 ± 4.1	67.1 ± 3.4	64.6 ± 4.4

Incidences of noise levels exceeding thresholds of BOBS BOS 575:2013 standard

The most significant main finding of this study is that:

Amongst all of the events and sampled locations at the 2019 *Makgadikgadi Epic*, none exceeded the thresholds of the BOS 575:2013 Standard.

RELEVANCE TO THE PROJECT

High potential Noise Immediting activities/Equipment within the project Area

- Generator
- A3 Traffic Movement
- Concrete Mixer
- Compactor
- Front End loader
- Excavator
- Roller

Noise monitoring within the project area will be conducted near the above mentioned equipment using the same equipment and methodology that was used in Makgadikgadi case study. The survey will focus on parameters acceptable to maximum permissible limits for environmental noise' (BOS 575:2013). The measurements will be made using a SVAN 977 sound meter (Class 1, with data loggers).

And then programmed using the Sound Level Meter 2.1.7 software. The below result will be monitored and subsequently action will be undertaken after the noise assessment onsite;

- Below 82 dBA: no further action
- 82 to 85 dBA: inform the worker of the noise monitoring results, the minimal risk of hearing loss, and the roles of hearing protection and audiometric testing

Above 85 dBA: a more detailed noise survey and other requirements of the Noise regulation, including education on the effects of noise on hearing and training on the use of hearing protectors. Any activity emitting high noise will subsequently lead to employees wearing ear plugs onsite.

4.2 Climate Change in Botswana

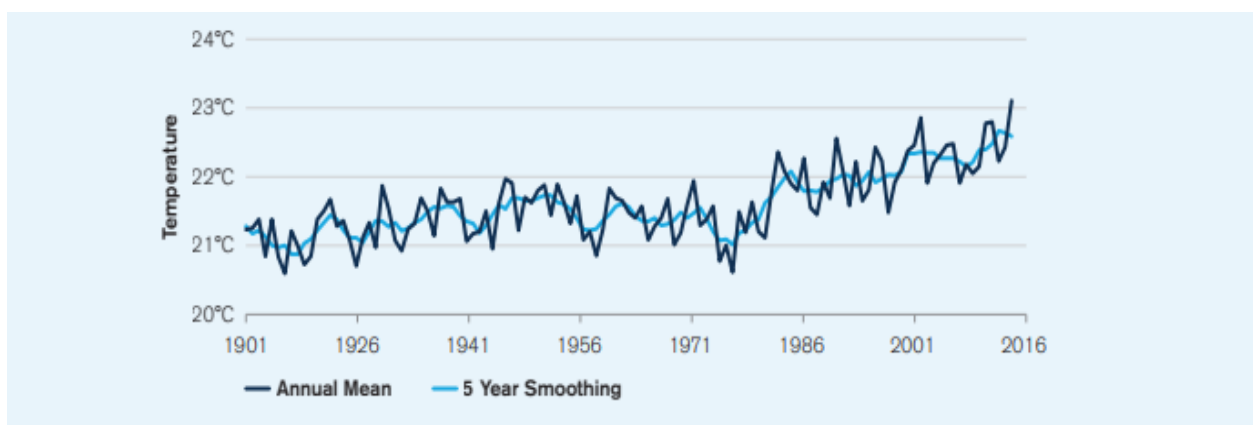
The overall climate of Botswana is classified as arid to semi-arid with highly erratic rainfall. The climate is determined by the country's inland location, astride the subtropical high-pressure belt. The Inter-Tropical Convergence Zone (ITCZ) brings moisture to the northern areas, and it becomes progressively

drier towards the western areas during the summer months (November to March). The mean annual rainfall ranges from over 650 mm in the north-east to less than 250 mm in the south-west. The national average rainfall is 475 mm per year. Most rain occurs in the months from October to April as localized showers or thunderstorms. The mean monthly maximum temperatures range from 29.5 °C to 35 °C in summer and 19.8 °C to 11.6 °C in winter. Due to the sparse and highly variable rainfall, Botswana is highly vulnerable to climate change (World Bank Group, 2020). Water is a scarce resource due to a combination of high evaporation rates (about 3 to 4 times the annual rainfall) and the limited permanent surface water sources over large parts of the country.

4.2.1 Key Trends

Temperature

Botswana has observed considerable temperature increases and average temperatures have increased by 1.5 °C, with central arid parts of the country’s interior observed to have increased by as much as 2 °C (**Figure 17**). The most noticeable increases in temperature have been observed between November and March. Throughout the southern Africa region, including Botswana, an increase in the number of warm days and nights have been observed along with a decrease in the number of cold days and nights (World Bank Group, 2020).



Source: Climate Risk Country Profile: Botswana, 2020

Figure 17: Observed temperature for Botswana, 1901-2019

Precipitation

Trends in precipitation for Botswana remain highly variable, however an overall reduction in precipitation has been observed for the southern Africa region; characterised by below normal rainfall and more frequent droughts. Botswana has observed a reduction in late summer precipitation, primarily from November to March. Changes in the onset, duration, and intensity of rainfall, including increased frequency of dry spells have also been observed. This has resulted in an increased frequency of intense rainfall events being experienced, as well as the frequency of more intense and longer lasting droughts (World Bank Group, 2020).

4.3 Topography

The project area is generally flat and dips gently towards the west (regional ground surface gradient is 1.7 m/km) to the Makgadikgadi depression at which the aquifer system of the project area

discharges. The ground elevation has a maximum variation of up to 100 m amsl with the highest elevation of about 1000 m amsl to the east and minimum elevation of approximately 900 m amsl at the edge of Sua Pan. Surface drainage is dendritic (having a branched form resembling a tree) and is dominated by the Moseitse River to the south, Tutume river, Semowane river and Nata rivers to the north. The streams run south-east to north-west and ultimately draining to the Makgadikgadi Pans as these form a regional surface water sink. Low gradients control the deposition patterns resulting in wide braided plains and inland deltas where the rivers enter Sua Pan. The 940 m amsl ground surface contour line represents the eastern-most limit of the palaeo-Makgadikgadi Lake. Upstream of this elevation, the river channels are highly sinuous, whereas downstream the channels are anastomosing. There are no perennial rivers in the sub-project area, although streams may flow for all or part of their length after heavy rains. The project area is dominated by well-developed plains with a thick sand cover of up to 20 m in most parts. There is however some significant topographic features occurring to the south east of the Dukwi Wellfield area where a linear ridge (Kgwana Hills) of quartzitic inselbergs trending north south dominates part of the project area. The hills are features of highest elevation of the project area at about 1065 m amsl.

4.4 Geology

The sub-project area (Dukwi / Sowa) belongs to the north-eastern Karoo sub-basin portion of the Karoo Basin in Botswana, which is centrally located and covers more than half the country and comprises a major Carboniferous to Jurassic siliciclastic sequence with widespread continental flood basalt belonging to the Karoo Supergroup. A review of the literature by Green (DGS, 1966), shows that the Karoo rocks in the study continue eastwards into Zimbabwe and Northwards into Zambia and the Caprivi Strip. The faulted edge of the stormberg cover overstepping the Ghanzi Chobe fold belt marks the western boundary of the Karoo supergroup of North-eastern Botswana, while to the south; the boundary is marked by a Precambrian basement outcropping as ridges south of Dukwi, coinciding with major post Karoo dyke swarms through Makgadikgadi pans. The ridges have significantly influenced sedimentation in the project area and they are recognised as the lower Karoo starter hence the Dwyka and Ecca Groups have been encountered only at the southern margins of the study area (Smith, 1984).

The Karoo supergroup in the study area is poorly exposed due to the thick Kalahari sand cover going up to 60 m in most areas. The geology of this area was therefore compiled based on data from a few outcrops present on the study area and a limited number of deep boreholes drilled in the area.

Table 43: Lithostratigraphic succession of the Dukwi Region

Age	Stratigraphic Unit			Lithology
	Supergroup	Group	Formation	
Tertiary & Recent	-	Kalahari	-	Alluvium, calcrete and Silcrete
Post-Karoo	Dolerite intrusions (Dikes and Sills)			
Late Carboniferous to Early Jurassic	Karoo	Stormberg		Basaltic Flood Lava
		Lebung	Ntane Sandstone	Aeolian and fluvial sandstone
			Ngwasha	Red to purple mudstone and sand stone
			Pandamatenga	White coarse sandstone
		Ecca	Upper Tlapana	Variegated mudstone
			Lower Tlapana	Dark carbonaceous shales and coals
			Mea Arkose	Fluvio-deltaic sandstone with insubordinate coals

		Dwyka	Dukwi	Grey varved mudstone and shale
Archaean Basement	Moseitse River Gneiss Group			Quartz, feldspar gneisses, migmatites and granitic gneisses
	Greenstone Belt Rocks			Chlorite-talc schists and amphibolites, characteristically green.

The main stratigraphic units in the area are presented in profile in **Table 43**. A description of the stratigraphy of the study as presented starting from the basement (Archaean basement) through the Late Carboniferous, Early Jurassic and the Post-Karoo age groups to the uppermost Tertiary and Recent age groups is as follows:

Archaean Basement

The Archaean basement is a complex of crystalline rocks which belongs to the Greenstone Belt Rocks Group and Moseitse River Gneiss Group. Greenstone Belt Rocks uncomfortably underlies the Moseitse River Gneiss Group and are characterised by the non-granitic schists or metasediments. The metasediments of this group are typified by the indurated greenish Chlorite-talc schists and amphibolite. The greenstone type rocks can be traced back by interpretation as part of the Archaean and Proterozoic belts of Zimbabwe, which truncate in the south against the Makgadikgadi Line. The Moseitse River Gneiss Group overlying the Greenstone Belt rocks outcrops south of the Dukwi along the Moseitse River. The Moseitse River Gneiss Group is represented by Quartz, feldspar gneisses, migmatites and granitic gneisses and is exposed in the southern part of the area represented by the Kgwana hills. The Kgwana hills consisting largely of grey variegated dolomitic limestones and graphitic schists. The limestones are sheared and brecciated and show copper mineralisation. The granitic gneisses predominate and are thought to be the product of granitisation of fine-grained quartz-feldspar-biotite rich gneiss group, but in trace amounts.

Karoo Supergroup

The Karoo rocks of northeast Botswana are poorly exposed but form part of the largest sedimentary sequence in the study area. The sedimentary sub-basin in the study area extends eastwards into Zimbabwe and northwards into Zambia and the Caprivi Strip. The lithological units in the Dukwi area are described below. The lower Karoo strata are represented by the Dwyka Group rocks which uncomfortably overlie the Archaean basement. The sedimentary sequence of this group forms the oldest sequence of the Karoo stratigraphy and were deposited under glacial conditions. The group is represented by rocks of the Dukwi Formation. The Dukwi formation is typified by beds of sandstone and tilloids and an upper member of Grey varved mudstone and shale.

The Dwyka Group is in turn unconformably overlain by rocks of the Eccca Group. The Eccca Group in the Dukwi area is represented by Mea Arkose Formation and the Tlapana Formation. On top of the Eccca group is the Lebung Group which is composed of the Pandamatenga, Ngwasha, and the Ntane Sandstone Formations.

Stormberg Group

The Stormberg Group comprises the youngest rocks of the Karoo Supergroup and is represented by basaltic lavas. The group is present mainly to the north of the Dukwi wellfield area. A narrow graben controlled by northwest trending lineament extends south-eastwards from the north into the wellfield area. Within this basalt graben some 30 m of highly weathered tuffaceous lava are present. The lavas

are typically grey-green to purple-grey, are fine grained, and contain amygdales and vesicles. Their widespread distribution suggests a non-explosive deposition.

Post-Karoo Intrusions

The post Karoo intrusions are dominated by the dolerite intrusions, which are not common in the study area except in a few cases. These intrusions took place after deposition of the Karoo Super Group (Stansfield, 1973). The doleritic dykes of the post Karoo intrusions exhibit a preferential trend or orientation towards West-North-West (WNW). These observations were made on intrusions just outside the project area. The intrusions in some localities occurred in the form of sub- horizontal sills.

Kalahari Beds

Calcretes and duricrusts of the Kalahari beds represent Tertiary and Recent Deposits, they have a wide distribution, and they almost conformably overlie the Ntane Sandstone. Other members of the Kalahari beds include sandstones (especially in the northern part of the Sua Pan) and alluvial sands along the riverbeds.

4.5 Hydrology (Geomorphology and Drainage)

The main geographical features in the sub-project area are the pans or playas (a dry, vegetation-free, flat area at the lowest part of an undrained desert basin). It is a location where ephemeral lakes form during wet periods, and is underlain by stratified clay, silt, and sand, and commonly, soluble salts) such as the Makgadikgadi and the ephemeral river Moseitse that drains seasonally from south east of the project area to north west of the project area into the Sua Pan which is also part of the greater Makgadikgadi pans.

Makgadikgadi Pan

Playas occur in arid regions where average annual rainfall does not exceed 500 mm. In general playas tend to have a negative water balance for most of the year due to marginal inputs combined with excessive losses in the form of evaporation and water infiltration. Large playas such as the Makgadikgadi, occupy continental basins which represent topographic low points in often flat and featureless landscapes. They may have been subjected to modification by recent Cenozoic tectonics and witness to higher lakes levels during a wetter past. The Makgadikgadi occupies the lowest point in the endoreic Okavango catchment and like most pans features no surface outflow. It may however host ephemeral surface water bodies following a short rainy season.

Pans may receive water in the form of direct rain contributions and considering the overall size of the Makgadikgadi (approx. 7000 km²), this may not be insignificant. They may also receive contributions in the form of surface and subsurface flow which in total may temporarily sustain lacustrine conditions. The overall hydrological regime of a pan is thus determined by external drainage controls such as catchment configuration and climate and internal controls such as the surface and groundwater relationship.

The Makgadikgadi Pan represents the lowest point in the Okavango catchment along with the Mababe depression and Lake Ngami. Numerous drainage lines enter the basin but many of these are considered fossil stream features and have not contributed surface water during modern time. A range of surface features such as the former lake shores to the north and west act as topographic watershed boundaries but may not have an impact on the movement of groundwater. Drainage

features in general are very subdued with the exception to the east of the Pans where watershed boundaries are well defined and rivers appear most active.

Most of the rivers in the east of Sua Pan are well incised and portray a dendritic surface pattern. Below the 1000 m contour the rivers (Semowane, Moseitse, Lepashe, Mosope) enter the terrain of the former lake floor which has a higher infiltration potential due to its calcareous and silica karst morphology. The watersheds between these rivers below the 1000 m contour are wide and flat and may act as direct recharge zones to the Pan basin. The channel flood plains widen towards the Pan and shallow discharge supports a host of riparian wetlands and delta systems.

Sua Pan

Southern and central Sua overall, appear to host larger water bodies than the northern section. This is surprising when considering the relative size of eastern catchments and observed discharge from the Moseitse, Lepashe and Mosope streams. In fact, the southern water body occurs mostly in the pan centre and is not closely associated with the pan margin inputs, unlike Moseitse in the central and Nata in the northern portion. This might suggest that lacustrine water in the northern portion is largely dependent on direct river runoff while water in the southern section is perhaps more dependent on groundwater discharge.

4.6 Hydrogeology

The project area comprises essentially of a wide range of hydro stratigraphic units dominated by an extensive sedimentary sequence of the Karoo supergroup. The hydraulic heads before abstraction were recorded and range between 28 and 40 mbgl (DWA, 1995). The formations comprising the hydro stratigraphic units of the study area encompass;

Ntane Sandstone

The Karoo rocks forms part of the largest sedimentary sequence in the north-eastern Botswana as previously envisaged. The Ntane sandstone is well spread in the Karoo sequence of Botswana, though generally fine grained, this formation has proved aquiferous on record in other areas. However, the Ntane sandstone on the Dukwi area does not show resourceful groundwater yields. On few occasions where substantial yields were intercepted in it around the study area, TDS values were too high for use as potable water for human consumption.

Mea Arkoses

Lithostratigraphic logs of wells drilled in the project area exhibit that this formation is extremely complex and variable locally both horizontally and vertically. The formation is characterised on a macro scale by a more argillaceous basal member overlain unconformably by a more arenaceous middle horizon underlying a top member comprising of argillaceous and arenaceous strata. Lithological variability of a formation increases chances of high porosity, permeability and hence good storativity and transmissivity. The variability of this sequence on a more local scale is of hydrogeological vitality since the variation may be at a well domain and hence will certainly be within the range of influence of any multiple well developments. Due to the extensive variability of this formation, no particular horizon or position within the sequence is considered more yielding since water is intercepted randomly during drilling at variable levels. However, bulk accumulated data reflects that the grits and arkoses of the lower middle Ecca (Mea Arkoses) formation generally constitute the widest spread and better aquifer horizons within the sequence. These conclusions are

further supported by GS10 project (1981) following their intensive investigation on Karoo hydrogeology in Botswana.

4.6.1 Groundwater Occurrence and Movement

Water occurrence and movement in the wellfield area was mainly derived from a database created from borehole certificates and wellfield hydrographs. According to the groundwater investigations carried in the project area (DWA, 1976).

Groundwater Occurrence

Generally, according to the study carried out in the project area, all the formations had water being struck in them, it is mainly with consideration to yield and number of water strikes that the Mea Arkoses is categorised as the main aquifer in the project area. The Ngwasha formation and the Pandamatenga formations come second and third, respectively, after the Mea Arkose in terms of average yield. It is concluded that The Mea Arkose Formation is the major aquifer and exists throughout the project area. The aquifer is highly heterogeneous and anisotropic according to Water Surveys Botswana main report (DWA, 1976). The transmissivity values were reported to be ranging from; 1.5 m² /d to 1760 m² /d. The Mea Arkose aquifer is generally confined mostly towards the North by the Tlapana formation. Water levels rise above the depth of interception as expected under confining conditions. Towards the southern part of the project area, the aquifer is reportedly exposed and hence unconfined, the shales of the Tlapana formation are absent in this section of the wellfield.

Groundwater Movement

According to the groundwater study report by Water Survey Botswana (DWA, 1976), the potentiometric contours for the study area reflect that regionally, hydraulic heads are lower on the western side of the project area (towards Sua Pan) as compared to the eastern side (East of Dukwi Wellfield). It is concluded that water generally flows in a westerly direction and discharges to the Sua pan as the study report envisaged. The maximum initial head difference in the study area is 70 m amsl. The huge hydraulic head differences across the project area are due to presence of barriers or boundaries and this is in convergence with the outcomes of a study carried out by water Surveys Botswana (DWA, 1976) where they made deductions that the study area has geological compartments which are poorly interconnected. Each compartment has a unique local flow pattern different from other adjacent compartments.

4.6.2 Project Boreholes (Dukwi Wellfield)

According to Nicholas O'Dwyer Sowa *Water Supply Scheme Preliminary Design Report* (October, 2021), the Dukwi Wellfield is the main source of water supply in the Dukwi region, supplying the main population centres of Sowa Township, Nata and Dukwi villages in addition to providing process water to BotAsh, a supplier of natural sodium products in northern Botswana. The existing wellfield was developed in 1985 and comprised 15 boreholes. There are currently four operational boreholes, with an average output of 4.7 Ml/day, at an average running duration of 22 hours per day (**Table 44**). The boreholes have an average depth of 100 m. As recommended in the National Water Master Plan Review (NWMPR 2006), the maximum sustainable daily abstraction from the Dukwi Wellfield is 3.9 Ml/day. The current abstraction of 4.7 Ml/day on average, is therefore an unsustainable long-term water supply solution. This abstraction scenario is also likely to result in encroachment of low quality (saline) groundwater and aquifer depletion.

Table 44: Dukwi Wellfield Operational Boreholes

Borehole No.	Operational Yield (m ³ /hr)
BH 7675	60
BH7678	65
BH7687	45
BH7647	50
Total	220 m³/hr

4.6.3 Project Boreholes Water Quality and Compliance

According to the Design Engineer's report, the Dukwi Wellfield boreholes and the surroundings have good water quality except that the water chemistry showing elevated major ions in some boreholes; sodium recorded as high as between 211 - 580 mg/L, calcium 106 – 155 mg/L and chloride 262 - 654 mg/L.

- TDS was observed to range within, marginal to brackish water with figures going between 600 to 1,890 mg/L except the extreme record of 36,154 mg/L at BH7487.
- There have been notable records of iron ranging between 0.69 to 4.90 mg/L and these mostly were picked from monitoring boreholes (BH7546, BH7639, BH7641, BH7642 & BH7671) the reason being that monitoring boreholes are not pumping hence the water tends to stand for a long time within the steel casing bore consequently forming some rust.

Although these boreholes have been tested, according to the project design engineers some of the tests required by WUC were not carried out on the samples collected. According to the system design engineers, water quality database produced was an informative, yet not a comprehensive, illustration of the water quality of the area. In more detail, there was no data on organic determinants; total organic carbon (TOC), THMs nor pesticides which are important compliance indicators. In addition, there was no data of chlorine dioxide, pH, turbidity, multiple microbial parameters (streptococci, clostridium, legionella, cholera, coliphages) that are of WUC priority. According to the Botswana Standard, BOS 32: 2015, Drinking Water Specifications, apart from those highlighted in red (**Table 45**), all other inorganic macro/micro determinants identified were assessed and found to comply with the standards.

Table 45: Water Quality Parameters of concern (BOS 32:2015, Drinking Water Specifications)

	Chloride	Calcium	Magnesium	Sodium
	00 (I) 200 (II) 600 (III)	80 (I) 150 (II) 200 (III)	30 (I) 70 (II) 100 (III)	00 (I) 200 (II) 400 (III)
BH7678	228	87	38	243
BH214512	773	322	121	83
BH7674	219	84	38	233
SOWA WW	227	84	38	244
DUKWI WW	221	85	38	242
BH7675	221	84	38	241
NATA WW	222	85	38	246
BH7687	230	87	38	252
BH10274	71	110	69	97

Furthermore, based on the WUC limits, apart from those highlighted in red, all other prioritised physical, organoleptic, and microbiological parameters set by the WUC are within suggested limits **Table 46**.

Table 46: Water Quality Parameters of concern (WUC Limits)

Botswana Standard, BOS 32:2015 - Drinking Water Specification			
	Total Hardness	Total Chlorine	Sodium
	≤ 500 mg/L	≥0.6 - ≤ 1.0 mg/L	Non-Detect [ND]
BH7678	370	<0.1	ND
BH214512	1305	<0.1	ND
BH7674	367	<0.1	53
SOWA WW	365	<0.1	10
DUKWI WW	369	0.2	ND
BH7675	365	<0.1	ND
NATA WW	370	<0.1	ND
BH7687	372	<0.1	1
BH10274	561	<0.1	3

Bio-Chemical Tests Results Analysis

The above data indicates that the current water treatment processes implemented must be assessed prior to this water being distributed as potable drinking water, for three key reasons:

Microbiological activity was detected in the majority of water samples, and in two samples (BH7674 and BH-214512) at high levels. This is usually not from the groundwater itself but from surrounding or runoff contamination. That said, the ongoing disinfection in the treatment works is not adequate since the chlorine residual is very low and fails compliance. This situation is likely to cause or have caused microbiological development in the waterworks too, not captured in the current sampling.

- The samples exhibited high concentrations of sodium and chloride which indicates that the boreholes water has saline intrusion, to the extent that the water is practically brine, and exceed the acceptable WUC/ BOS standards levels.
- The water samples indicate high water hardness, with the exception of borehole BH214512 which exceeds acceptable hardness levels. Apart from potential public health concerns, hard water can cause severe damage to water infrastructures due to mineral build-up and corrosion.

If these sources are to be used, then reverse osmosis is the most efficient process to be proposed. Other combinations such as hybrid RO or ion exchange resins could also be suggested.

Treatment Options

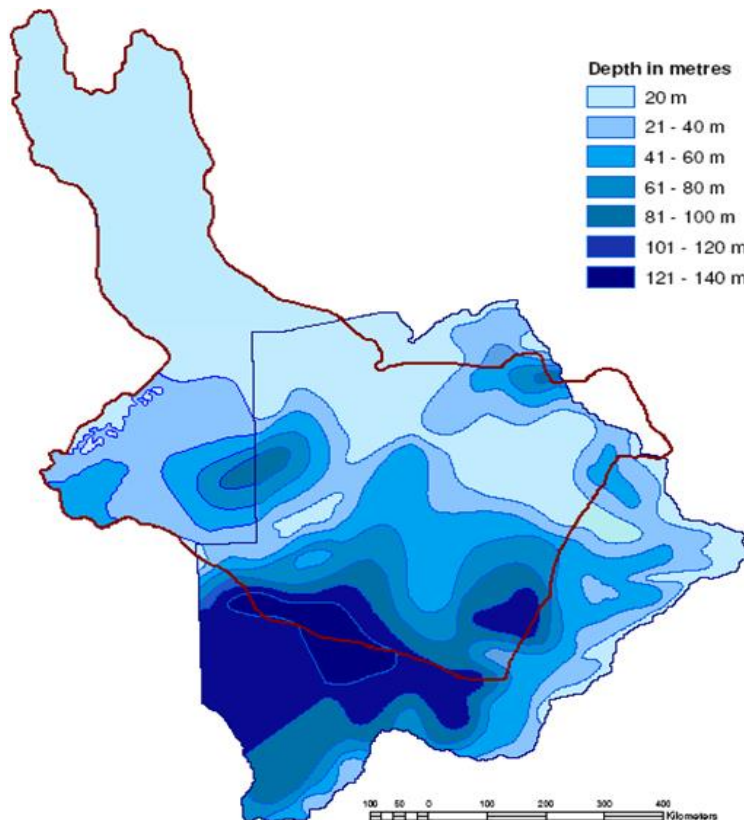
Based on the water quality assessment if these sources are to be used for drinking water purposes, then the following are needed to be carried out:

- Upgrade the chlorination systems, to comply with regulatory standards and to safeguard consumers from waterborne bacteria.
- Reverse Osmosis (RO membrane technology) is the most efficient process to remove the salt and mineral contents.

- Other treatment options may include hybrid RO membranes, or ion exchange resins could also be considered.

4.6.4 Project Area Groundwater Vulnerability

Vulnerability to pollution in the project area is High (**Figure 18**). According to groundwater resources comprehensive protection report, the project area falls within the Moderate Protection Area.



Source: Botswana Hydrogeology Maps

Figure 18: Botswana Ground Water Vulnerability Map

4.7 Climate Change Impacts on Water Resources

4.7.1 Effects of Climate Change on the Sub-Project

The most severe impact of Climate Change in a semi-arid country like Botswana is in a form of droughts. Droughts can be caused by several factors, some natural, some related to human-caused climate change, others driven by a range of human activities. The latest science says that as the climate warms, more precipitation is falling as rain as the case with Botswana, evaporation and transpiration increase too. All of these, combined with rising temperatures, can reduce water availability and increase water demands.

Changes in precipitation, rising temperatures, groundwater depletion, and human decisions are exacerbating drought conditions in many regions especially the sub-sahara regions of Africa. When considering the relationship of drought to climate change, it is important to distinguish between weather and climate. Weather is a description of atmospheric conditions over a short time (i.e., days

or weeks), while climate is how the atmosphere behaves over relatively long periods (i.e., years, decades, or longer). Climate change occurs over extended periods of time and manifest as changes in the patterns of weather events one would generally expect based on historical averages. While any one particular dry period in the past could have been dryer than a particular dry period now.

In most parts of the country, rising temperatures associated with future climate change are expected to decrease surface soil moisture. Even without future changes in precipitation, this drying of soils is likely to cause future droughts across the country and to be stronger and longer lasting than those of the past.

According to Statistics Botswana, droughts have affected many regions of the country during the period between 1981 – 2014. Specifically, the whole country was drought stricken during these periods: 1981-1987; 1991-1999; 2001-2005; 2007-2008; 2011-2013; and 2014. The worst drought in recent years was from 1981 to 1987 followed by 1990 to 1995. The results also indicate that Ghanzi, Kgalegadi, Southern and South-East Districts had the highest drought severity compared to other Districts (Botswana Environment Statistics: Natural Disasters Digest, 2015).

It is anticipated that climate change will have serious impacts on the livelihoods of communities within the project area and the natural environment they depend on. Some of the climate change consequences will have impact over the longer term like spread of disease, while some have immediate obvious impacts, such as intense rain and flooding. While recognising the importance of other projected consequences of climate change, this section of the report focuses mainly on temperature extremes and precipitation as the main drivers of natural disasters (floods and droughts) in Botswana.

Rainfall and temperatures are the most critical factors that determine the severity of the drought situation in any given area. Low rainfall and extreme temperatures present high chances of drought whereas good rainfalls and normal temperatures show low chance of drought. Botswana is a semi-arid country with four seasons: i) Summer (November-January) - with maximum rainfall and generally hot, ii) Autumn (February-April) - with less rainfall than in summer and slightly hot, iii) Winter (May-July) - is cold and dry and iv) Spring (August-October) - often dry and hot.

4.7.2 Climate Change Impacts on Water Resources

Overview

Groundwater is the main source of potable water supply in Botswana. Except for the urban centres and a few major villages, most villages depend on groundwater for their water needs. However, groundwater recharge is very limited and surface water resources are the main source of water supply for urban areas. Supply from surface water was expected to rise to 57% of consumption in 2020, with the Limpopo and Zambezi rivers viewed as potential sources to meet the country's future water needs. The main threats to the water resources are over-exploitation and pollution. The main sources of pollution are industrial and domestic effluent from settlements, human waste from pit latrines, and waste disposal on the dam catchment areas and shallow aquifers. Water sources are monitored on a regular basis to assess the deterioration in the quality. (The World Bank Group (2021). *Climate Risk Profile: Botswana*).

Climate change is expected to increase the risk and intensity of flooding as well as increase the likelihood for water scarcity for northern, central and eastern areas of the country. Increased potential for higher intensity rainfall events will lead to the heightened risk of flooding, loss of life, and damage to property and infrastructure. Intense rainfall and flooding may also result in soil erosion and water

logging of crops, thus decreasing yields and increasing food insecurity. The increased likelihood of increased aridity and drought stress is expected to lead to water scarcity in some areas, resulting in increased demand for water, raising the potential for conflict and biodiversity loss. Higher temperatures with increased aridity may also lead to livestock stress and reduced crop yields (The World Bank Group (2021). *Climate Risk Profile: Botswana*).

This is likely to result in significant economic losses, damage to agricultural lands and infrastructure as well as human casualties. Furthermore, land degradation and soil erosion, exacerbated by recurrent flood or drought, adversely impacts agricultural production, further affecting the livelihoods of the rural poor. Small rural farmers are more sensitive to impacts of disasters (floods, dry periods) because they have limited resources with which to influence and increase their adaptive capacity (The World Bank Group (2021). *Climate Risk Profile: Botswana*).

Floods are the most frequently occurring disaster event in Botswana and are primarily caused by heavy rains that mainly affect communities in flood-prone areas like Okavango River Basin. Disasters have historically been concentrated along rivers such as the Zambezi River, the Okavango river and its delta, Boteti river and Limpopo river. Storms, typically emanating from tropical cyclones occurring in the region from the Indian Ocean, result in heavy rains and flooding. Increasing urbanization has increased flood risk locations due to the absence of functioning water drainage systems (The World Bank Group (2021). *Climate Risk Profile: Botswana*).

4.7.3 Climate Change Impacts

Water Quality and Availability

Changes in water quality and availability is expected to be the predominant impact in Botswana in future climate scenarios. Stream flows for the project area is projected to decrease by 20% (World Bank Group) and more variable rainfall will also likely increase disasters associated with droughts, floods and waterborne diseases.

Water Demands and Food Security

Rising demands and increasing levels of pollution across shared water resources are a critical problem. Expected changes in weather patterns are likely to increase the country's vulnerability and further stress domestic water dependency. Unpredictable rainfall patterns and water scarcity, dry spells and desertification, and crop diseases put agricultural production at risk, mainly exposing rural areas and subsistence farmers to unsustainable agricultural livelihoods, food insecurity and health vulnerabilities. While droughts and floods are normal events in the region's climate context, increased frequency and intensity is cause for concern.

Surface Water and Groundwater

Groundwater exploitation is at risk of exhausting wellfields and supplies from surface water is expected to rise to 57% of consumption by 2020. Projected increases in the frequency of droughts, increased evaporation and evapotranspiration along with potential changes in rainfall patterns and runoff may further reduce availability in water-scarce regions (northern, eastern and central). Rainfall and evaporation changes also impact degrees of surface water infiltration and recharge rates for groundwater and low-water storage capacity increases the country's dependence on increasingly unreliable rainfall patterns. Changes in rainfall and evaporation translate directly to changes in surface water infiltration and groundwater re-charge. This has the potential for further decreased reliability of unimproved groundwater sources and surface water sources during droughts or prolonged dry

seasons. Increased strain on pump mechanisms leading to breakdowns if maintenance is neglected and the potential for falling water levels in the immediate vicinity of wells or boreholes, particularly in areas of high demand. Additionally, temperature increases have the potential to result in increased soil moisture deficits even under conditions of increasing rainfall (The World Bank Group (2021). *Climate Risk Profile: Botswana*).

4.7.4 Specific Water Sector Mitigation Measures

Current responses to drought tend to focus on short-term measures, such as temporary water conservation and efficiency improvements, water transfers from one basin to another, and increased groundwater use during dry periods. However, with increased drought risk and continued unsustainable patterns of groundwater use, the government must incorporate longer-term efforts that reduce vulnerability and increase resilience to more frequent, severe, and longer-lasting drought conditions. The single most important step in limiting drought risk is getting to “net negative” global CO₂ emissions by mid-century, according to the Inter-Governmental Panel on Climate Change’s Special Report 1.5°C report.

Mitigation Measures:

- Reduce carbon emissions both nationally and as part of global efforts to reach net zero no later than 2050.
- Reduce water use from every sector, especially agriculture, to sustainable levels.
- Reduce acreages of crops that use the most water. This doesn’t mean eliminating those crops; it means reducing their area to sustainable levels, so that future generations can also have access to those commodities.
- Improve regional monitoring and measuring of water supply and uses
- Target sources of surface and groundwater pollution that reduce water availability (for example, overuse of fertilizers and pesticides)
- Increase recycling and reuse of water, including by capturing and reusing stormwater, greywater, and wastewater
- Increase efforts to sustainably manage groundwater resources
- Increase maintenance and modernize infrastructure to reduce leakages and health risk from old pipelines
- Update the operations of the infrastructure that comprises our water systems, such as reservoirs. Many of these systems still operate with assumptions based on what our climate was like in the past and have not yet integrated advances in weather forecasting or updated climate information.

4.7.5 National Adaptation Options

Botswana should address the challenges of its water resources arising from increasingly variable rainfall patterns. Minimal data on groundwater resources exists and further resources should be invested to support existing monitoring of irrigation, groundwater wells and aquifers. Sustainable and reliable development and proper use of the water resources of Botswana is necessary and should be led through a water resources management policy which will enhance and promote national efforts towards the efficient, equitable and optimum utilization of available water resources. Botswana has integrated water management into all important economic sectors and has developed a National Water Master Plan to support its broader climate change adaptation agenda. As the country continues to develop and urbanize, increasing pressure can be expected on the water demands and related infrastructure. As such, development planning for urban expansion should be coordinated through the country’s climate change adaptation strategies to ensure appropriate water management

strategies are used and enacted. Planning and adaptation strategies for water resources should also be included within development strategies for agriculture, infrastructure, and energy sectors. Improvements to the country's water infrastructure should be a priority (The World Bank Group (2021). *Climate Risk Profile: Botswana*).

4.8 Soils

The soils in the project area have been mapped as predominantly arenosols (i.e. sandy soils). It is of fundamental importance to this sub-project to recognize that the parent material of the soils is extremely fine sand and silt, derived from the fossil deltaic system. Further, because the climate is dry, the development of the soil horizon is very thin indeed. These are very fragile soils, vulnerable to erosion. The arenosols have been variously subdivided. Only features of relevance to this sub-project are considered and detailed below:

- In some areas the soils are calcretised. The evaporation of calcium-bearing water has resulted in the precipitation of calcite within the sandy groundmass. Where it is poorly developed, the result is a powdery calcrete which is very susceptible to erosion. Where it is well developed it lithifies the sand, resulting in hard, rubbly material which is much more resistant to erosion.
- In other areas, there is an accumulation of salts in the surface soils. Such salts have profound effect on the soil textures. They occupy exchange sites and this prevents the soil particles from forming aggregates. Aggregates are less vulnerable to erosion than are the salt saturated individual particles. Thus, the result is increased susceptibility to erosion.
- Where the soils have a proportion of silt and clay, there is a tendency for the surface layer to compact, forming a sealing skin. This protects the soil from erosion but is easily broken down by trampling.
- The arenosols provide a very poor medium for rooting. Recovery of the protective plant cover is difficult when it has been destroyed and the bare soils become very vulnerable to erosion.

4.9 Biodiversity

4.9.1 Background

This assessment is a rapid evaluation of the ecological environment around the proposed Sowa Water Supply Scheme (SWSS) covering the settlements of Kotamogoree, Moseitse, Dukwi, Dukwi Refugee Camp, Sowa Town, Nata, Maposa, Manxotae and Sepako. This assessment is based on literature review and expert landscape interpretation.

4.9.2 Large Landscape Ecological Function

The eastern Makgadikgadi landscape, and the project area of the proposed water supply scheme project, is an area of high ecological value in Botswana, particularly the presence of the salt pans and associated ephemeral hydrological features. At a large scale, three major vegetation types are described (**Figure 19**), however, at a fine scale the inherent African Savanna variability is characteristic. The observed ecological variability in this large landscape is a function of multiple factors including rainfall and moisture gradients, underlying geology, soils and geo-morphology, hydrology and associated anthropogenic effects.

There are a number of notable hydrological features in the large landscape that influence biological species distribution and large landscape ecological connectivity and continuity. Notable features include the Makgadikgadi Salt Pans, local drainage systems (e.g. Nata and Moseitse, and tributaries), and isolated ephemeral water pans. Typical of semi-arid African savannas, biodiversity-landscape (i.e. species distribution and wildlife movement patterns) interactions in this landscape are expected to be

influenced mainly by surface hydrology as the primary limiting factor in semi-arid African savannas. In addition, the comparatively high biological diversity of the large landscape is a result of its location in relation to major conservation areas of Botswana and Zimbabwe; Makgadikgadi and Nxai national parks, the Makgadikgadi Salt Pans and the Hwange complex of protected areas of Zimbabwe. Across the international boundary into Zimbabwe there is a series of conservation areas (i.e. Matetsi, Hwange National Parks, Kazuma National Park and WMAs) also generally arranged linearly along the international boundary and in the general north of the project area. Most protected areas in the large landscape are devoid of human settlements and hence anthropogenic effects tend to be very minimal, and thus the significant biodiversity value of the large landscape.

Based on the above and specialist large landscape interpretation, large landscape connectivity is known to occur across the area traversed by this proposed water supply scheme. Specifically, elephant (*Loxodonta africana*), gregarious large herbivores and large carnivore populations (e.g. lions *Panthera leo* and wide ranging African wild dogs *Lycaon pictus*) are known to occur in the area, with a general northward increasing pattern. However, from Nata southwards, there is extensive fencing for agricultural production (e.g. TGLP ranch at Sepako and Maitengwe Quarantine) and disease control (e.g. Ngwasha, Dukwi and Serule fences) and relatively high anthropogenic activity. Often, biodiversity is inversely correlated with human activity and hence this segment of the proposed water supply scheme is associated with comparatively lower species richness, density, abundance and ecological function (**Figure 15**). However, with the recent and ongoing expansion of the elephant range, occurrence of this species is increasing even in the southern part of the project area. Occurrence of elephant, a highly water dependent species, has consequences on the proposed water supply scheme. Also, some section of the Botswana-Zimbabwe international boundary is fenced with a wildlife proof livestock disease control fence (primarily foot and mouth). Due to this extensive fencing possible ecological connectivity, specifically of transboundary large mammalian species mobility is compromised.

4.9.3 Small Scale Ecology

The landscape also carries various micro-scale sites of ecological significance. Some of these sites are very critical for the long-term survival of some wildlife populations of notable conservation concern. Examples here include the Makgadikgadi Salt Pans that are critical foraging and breeding grounds for flamingo species (*Phoenicopterus roseus* and *Phoeniconaias minor*), scattered natural water pans, isolated grassland plains and water courses. Also, within the major vegetation types depicted in Figure 19, biological species (i.e. relative diversity; density, abundance and distribution) exhibit very high fine scale spatial and temporal variability typical of semi-arid African Savannahs. The three major vegetation types of the project are only defined based on dominant species and are not homogenous. Small scale ecological variability ensures survival of sedentary species that do not respond to spatiotemporal resource heterogeneity by extensive movement. In addition, these micro scale patches provide habitat for specialised species, e.g. salt tolerant species.

4.9.4 Habitats and Vegetation

Vegetation and habitat characteristics in semi-arid savannas tend to be mainly influenced by water and moisture gradients. Therefore, physiognomic (physical characteristics), species richness and diversity, density and biomass at a large landscape level are correlated with rainfall that generally increases in the northerly direction. In this regard, vegetation characteristics (biomass, species richness and canopy height) generally increase in the northerly direction, i.e. towards Sepako. At a smaller scale, the presence of rivers and streams and natural pans also do influence micro-scale vegetation and habitat variability, specifically high vegetation biomass, density and species diversity can be expected along and around hydrological features.

Figure 19 shows that the proposed water supply scheme will traverse three major vegetation classes of varying acreage. The proposed water supply scheme runs through a Mopane Woodland, Odyssey (Makgadikgadi) Grassplains and the Salt Pans. The Mopane Woodland, as the name suggests, is dominated by *Colophospermum mopane*. However, the relative abundance, physiognomic and structure of this vegetation class varies with natural environmental gradients and human activity. For example, the mopane tends to grow taller where there is more water and lower levels of anthropogenic activity. Therefore, the Mopane vegetation class is further sub-divided into four sub-classes based on physiognomic features and relative abundance of dominant woody species (see **Figure 19**).

The northern most sub-class, Mopane-Combretaceae is the tallest canopy in the project area and dominant species are Combretaceae species (*Combretum imberbe* (leadwood), *C. zyherri* (red willow bush) and *Terminalia sericea* (sliver cluster leaf)) and distinct mature *Vachellia erioloba* (mogotho) patches. The Mopane-Mimosoideae class, in addition to mopane comprises of various Mimosoideae (formerly Acacia) including *Vachellia nigrescens* (knob thorn), *Senegalia mellifera* (hook thorn) and *Vachellia tortilis* (umbrella thorn)). Mixed Mopane and Mopane-Terminalia generally are typical lower canopy vegetation classes mainly associated with the southern sections of the project area. The mixed mopane carries high woody species diversity including Mimosoideae species, *Grewia* species, *Commiphora* species and *Dichrostachys cinerea*). The Mopane-Terminalia class is dominated by mopane and *Terminalia sericea*). A plant species of notable conservation classification, the baobab (mowana *Adansonia digitata*) was also reported in the ecological surveys. This species, tended to be of restricted distribution between Dukwi village and the Sowa Town junction.

The Grassland Plains are typically open habitats dominated by monocotyledonous species. Within this vegetation type, the salt tolerant *Odyssea paucinervis* is dominant, particularly around the Makgadikgadi Pans.

The Riparian vegetation, also though not defined in **Figure 19**, as the name suggests is often a narrow belt of thick dense and often evergreen vegetation associated with hydrological features. In these semi-arid savanna environs, the linear nature and comparatively long-term occurrence of water in the Riparian is critical for ecological function; e.g. areas of high biodiversity and can facilitate ecological connectivity. Various species occur in this vegetation class. Often water tolerant Mimosoideae species (*Vachellia* spp and *Senegalia* spp) and Combretaceae (e.g. *Combretum imberbe*), *Ziziphus mucronata* and figs (*Ficus* spp), raintree *Philenoptera violacea* are common in the Riparian fringe. High avian activity is also often associated with this vegetation class.

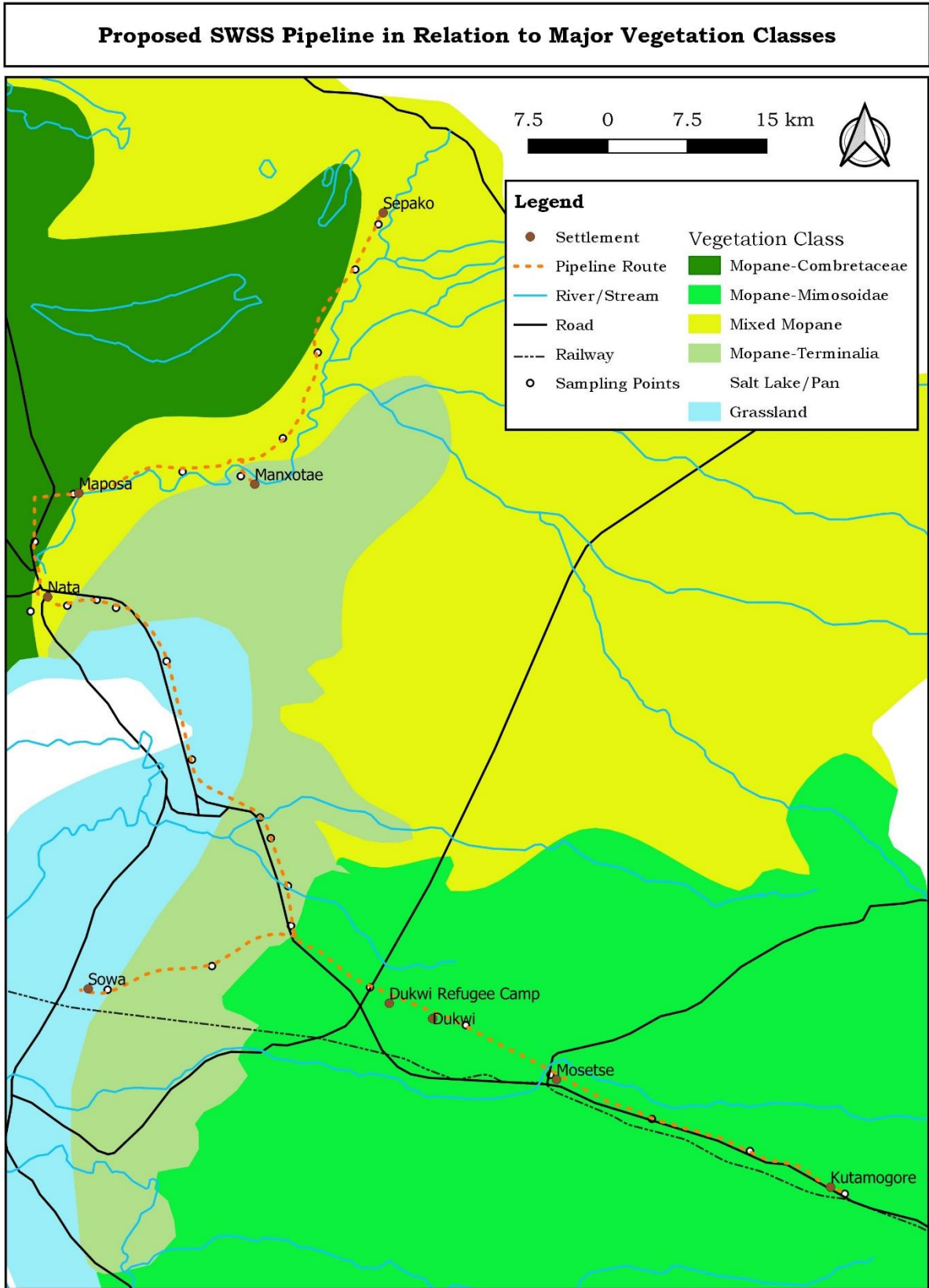


Figure 19: Major vegetation classes along the proposed Sowa Water Supply Scheme project

4.9.5 Fauna

Wildlife diversity generally increases in the northerly direction. In particular, the area immediately north of Nata is associated with a sudden increase in faunal diversity as a result of very low anthropogenic activity and that the area is closer to conservation areas in both Botswana and Zimbabwe (**Figure 22**). The African elephant is a species of critical importance *vis-à-vis* the proposed water supply project. The African elephant is a water dependent species and require notable (>100 litres) at one drinking session. In addition, the elephant can detect underground water leakages and with its capability to dig or unearth chambers, it can access the water supply pipe.

Figure 21 illustrates this, elephant have been able to gain access to similar water pipelines serving Phuduhudu village along the Nata-Maun road (direct observation, Gosiam Neo-Mahupeleng). Access to the pipeline was mainly at pressure release valve chambers. All chambers that presented evidence of elephant access to the pipeline were filled with water (**Figure 21**). However, it could not be determined whether the water in the chambers was due to prior pressure valve malfunction or elephant tempering with the pipeline structures. In this regard, based on distribution of elephant activity, its habituation to the pipeline is expected to be most common from Semowane river, and progressively increase in the northerly direction. Elephant impact on the pipeline structures is expected to be most pronounced between the road to Kasane and Sepako village where ecological surveys recorded the highest elephant activity (i.e. dung pile frequency, **Figure 22**).

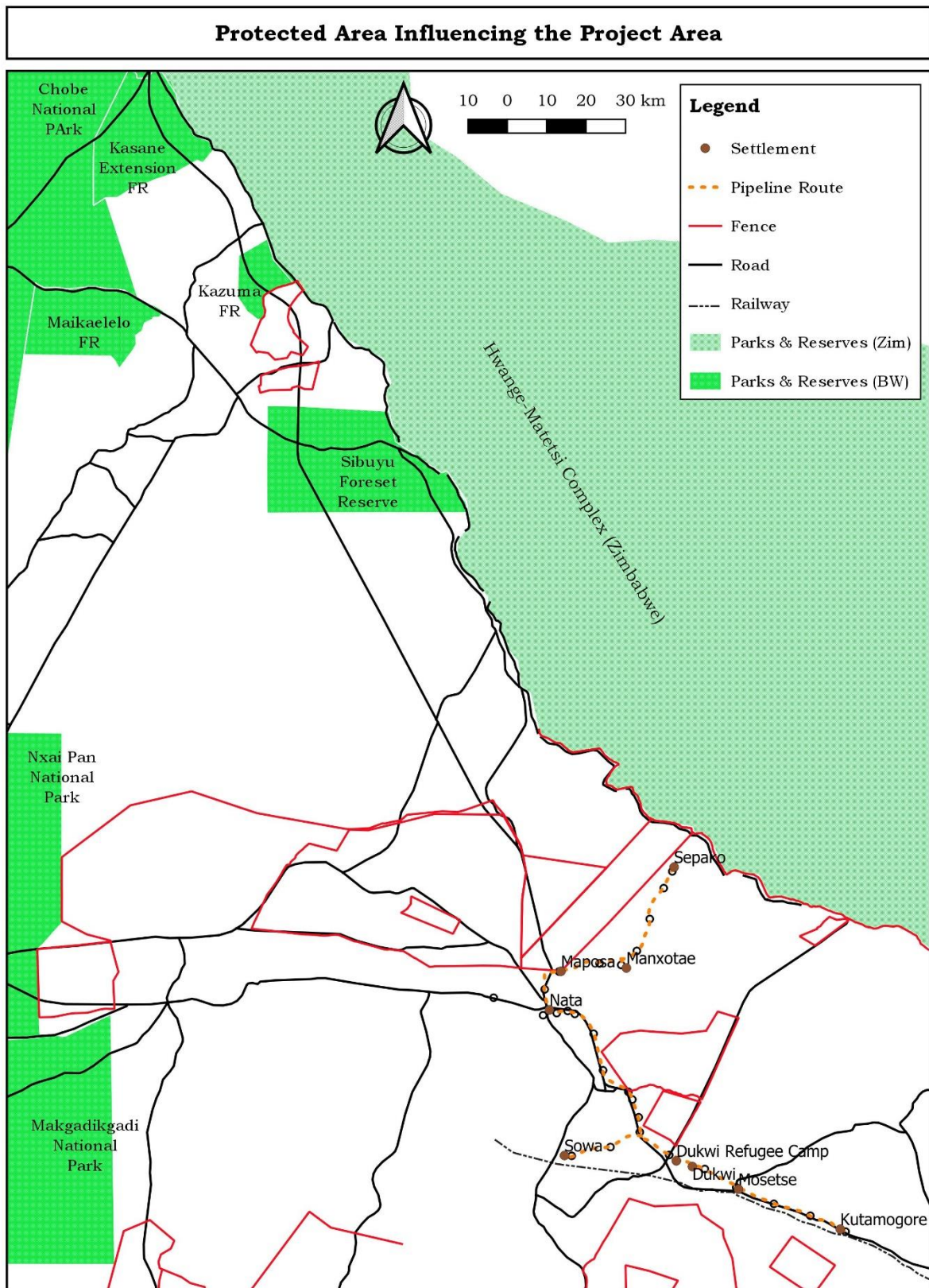


Figure 20: The proposed Sowa WSS in relation to major protected areas of the sub-region



Figure 21: Evidence of elephant accessing water from the pipeline to Phuduhudu village

Based on field ecological surveys, expert knowledge of the fauna of the area and literature, faunal species known to occur in the SWSS project area are given in **Table 47** Error! Reference source not found. and **Table 48** Error! Reference source not found..

Table 47: Mammalian and other faunal species, with their international and national conservation classification, known to occur in the SWSS project area

Species	Scientific Name	Conservation Status (IUCN Redlist and National Classification)
African elephant, tlou	<i>Loxodonta africana</i>	Vulnerable. Protected
Chacma baboon, tshwene	<i>Papio ursinus</i>	Least Concern
plains zebra, pitse e tilodi	<i>Equus quagga</i>	Near Threatened
eland, phofu	<i>Tragelaphus oryx</i>	Least Concern
girrafe, thutlwa	<i>Giraffa camelopardalis</i>	Vulnerable. Protected
ground squerell, sekatamosima	<i>Xerus inauris</i>	Least Concern
impala, phala	<i>Aepyceros melampus</i>	Least Concern
kudu, tholo	<i>Tragelaphus strepsiceros</i>	Least Concern
roan antelope, kwalata e tshetha	<i>Hippotragus equinus</i>	Least Concern. Protected
sable antelope, kwalata e ntsho	<i>Hippotragus niger</i>	Least Concern. Protected
steenbok, phuduhudu	<i>Raphicerus campestris</i>	Least Concern
Suricate	<i>Suricata suricatta</i>	Least Concern
tree squirell, sethora	<i>Paraxerus cepapi</i>	Least Concern
vervet monkey, kgabo	<i>Chlorocebus pygerythrus</i>	Least Concern
monitor lizard, kgwathe	<i>Varanus exanthematicus</i>	Least Concern

It should be noted that the project area falls within the high elephant (*Loxodonta africana*) density area of the sub-region with population estimated in excess of 200 000. The area carries the highest density of large herbivore species including the rare sable (*Hippotragus niger*) and roan antelope (*H. equinus*). A full suite of large African carnivores is extant in the area, i.e. tau African lion (*Panthera leo*), nkwe leopard (*Panthera pardus*), phiri-phamola spotted hyaena (*Crocuta crocuta*), lengau cheetah (*Acinonyx jubatus*), lehiritshwana brown hyaena (*Parahyaena brunnea*), phokoje black-backed jackal (*Canis mesomelas*) and side-striped jackal (*Canis adustus*), and thwane caracal (*Felis caracal*). Prominent avian species include the ostrich (*Struthio camelus*), kgori bastard (*Ardeotis kori*), secretary bird (*Sagittarius serpentarius*), gallinaceous birds, water fowls and wide array of raptors (e.g. manong (vultures). **Table 48** Error! Reference source not found. depicts avian species known to occur in the area.

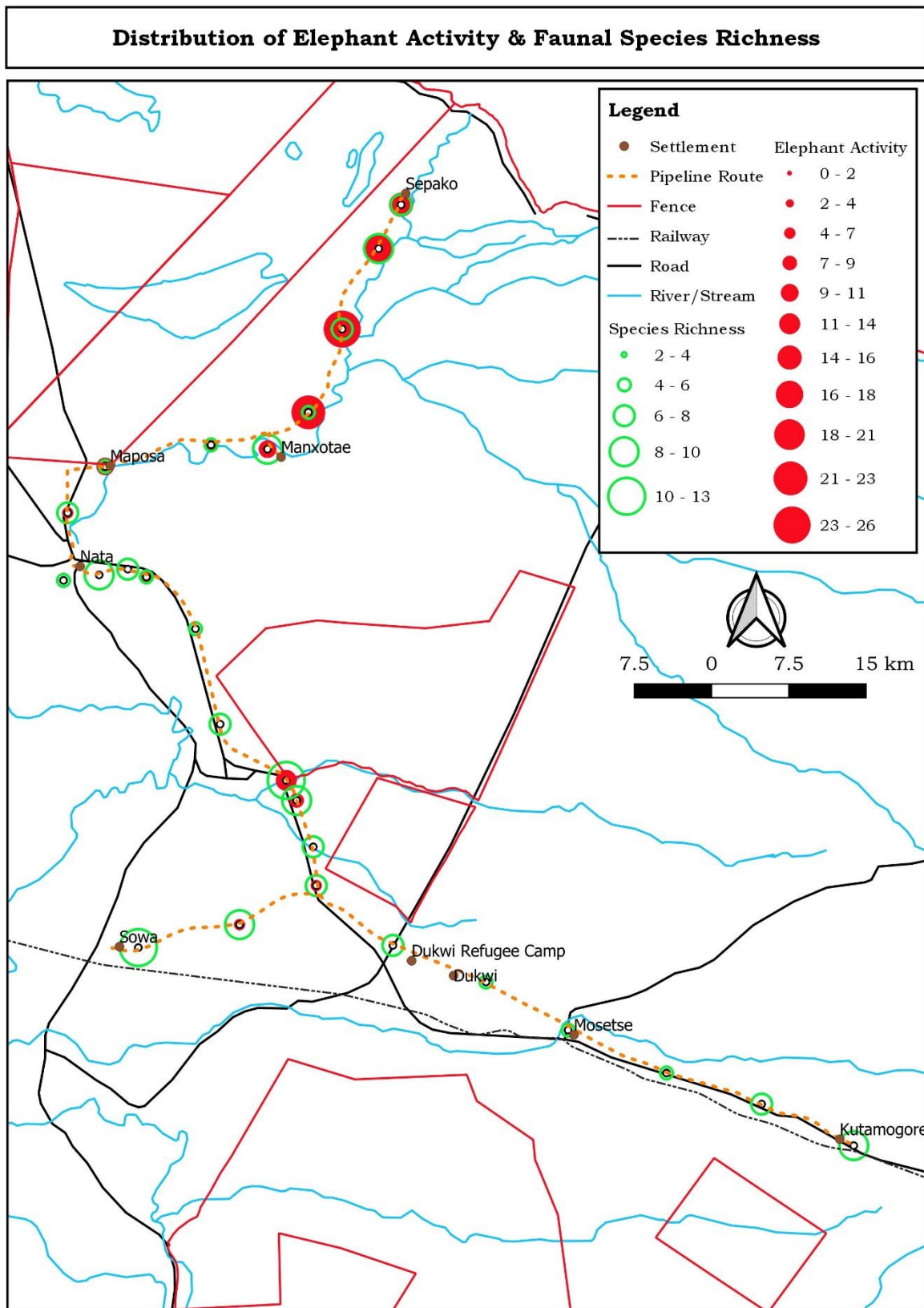


Figure 22: Distribution of elephant activity and biological species richness along the route of the proposed water supply scheme pipeline

Table 48: Avian species, and international and national conservation classification, known to occur in the project area

Species	Scientific Name	Conservation Status (IUCN Redlist and National Classification)
bateluer, peteke	<i>Terathpius ecaudatus</i>	Near Threatened. Protected
black crow, legakabe	<i>Corvus capensis</i>	Least Concern
black-headed heron	<i>Ardea melanocephala</i>	Least Concern. Protected
blacksmith lapwing, thatswane	<i>Vanellus armatus</i>	Least Concern
blue waxbill, rabiibii	<i>Uraeginthus angolensis</i>	Least Concern
buffalo weaver,	<i>Bubalornis niger</i>	Least Concern
cattle egret, mamoleane	<i>Bubulcus ibis</i>	Least Concern. Protected
Egyptian geese, sehudi	<i>Alopochen aegyptiacus</i>	Least Concern
fish eagle, audi	<i>Haliaeetus vocifer</i>	Least Concern
glossy starling, legodi	<i>Lamprotornis nitens</i>	Least Concern
greater cattle egret,	<i>Egretta alba</i>	Not Listed. Protected
grey hornbill, koro	<i>Lophoceros nasutus</i>	Least Concern
grey lourie, mokowe	<i>Corythaixoides concolor</i>	Least Concern
helmeted guinea fowl, kgaka	<i>Numida meleagris</i>	Least Concern
Kori bustard, kgori	<i>Ardeotis kori</i>	Near Threatened. Protected
knob-billed duck, ranko	<i>Sarkidiornis melanotos</i>	Least Concern
laughing dove, leebea	<i>Spilopelia senegalensis</i>	Least Concern
banded goshawk, segootsane	<i>Accipiter badius</i>	Not listed. Protected
marabou stork, liya	<i>Leptoptilos crumenifer</i>	Least Concern. Protected
Namaqua dove, mokudinyane	<i>Oena capensis</i>	Least Concern
common buzzard, nkgodi	<i>Buteo buteo</i>	Least Concern. Protected
pieb crow, legakabe	<i>Corvus albus</i>	Least Concern
red-billed quelea, thaga	<i>Quelea quelea</i>	Least Concern
red-billed hornbill, koro	<i>Tockus erythrorhynchus</i>	Least Concern
Red-billed francolin, lesogo	<i>Pternistis adspersus</i>	Least Concern
Secretary bird, thangwe	<i>Sagittarius serpentarius</i>	Vulnerable. Protected
spur winged goose, sehudi	<i>Plectropterus gambensis</i>	Least Concern
white-backed vulture, lenong	<i>Gyps africanus</i>	Critically Endangered. Protected
lappet-faced vulture, lenong	<i>Torgos tracheliotos</i>	Endangered. Protected
Cape vulture, lenong	<i>Gyps coprotheres</i>	Endangered. Protected
yellow hornbill, koro	<i>Tockus leucomelas</i>	Least Concern

5. SOCIAL BASELINE

This chapter presents the social baseline for the project villages which is briefly summarized in **Table 49** and social baseline for the Dukwi Refugee camp summarized in **Table 50** respectively.

Table 49: Summary of Social Baseline for the Project Villages

Project village	Dukwi	Kutamogoree	Nata	Manxotae	Maposa	Mosetse	Sepako	Sowa
Population (Males & Females)	6,507	1,065	7,732	725	489	2,276	736	3,598
• Youth (18-35 years)	1893	197	2241	216	145	776	169	1590
• Children (under 14 years)	2508	519	2623	362	240	806	340	387
• Elderly (over 65 years)	196	132	303	25	16	161	43	9
Predominant Livelihoods	Subsistence Agriculture, Ipelegeng, and Poverty Eradication programmes							Mining
Poverty Rate	0.247	0.28	0.288	0.421	0.326	0.129	0.4	0.033
Unemployment Rate	11.4	20.0	12.1	31.7	12.4	7.3	3.7	12.7
Vulnerable Communities (Basarwa) under OP4.10		Basarwa		Basarwa		Basarwa		
Other Vulnerable and Disadvantaged Groups	Refugees at Dukwi Refugee Camp							
Other Ethnic Groups (and languages spoken)	Bakalaka, Barolong, Batalaote, Bakhurutshe, Bangwato. There may be some Basarwa working menial jobs in the different villages.							
Education Facilities								
No. of Primary Schools	1	1	2	1	1	1	1	2
Enrolment	907	415	2000	342	693	335	302	417

Pass rate	62	89	74	30	73	35	53	86
Community members on Anti-Retroviral Therapy	495	207	1,407	30	85	274	29	626
Health Facilities	2	1	1	1		1	1	1
-Total No. of Standpipes	3	6		5	7	1	10	
-Total No. Standpipes Working	3	4		1	4	0	4	
-Total No. Standpipes not Working	0	2		4	3	0	6	
Housing	Traditional and Standard Housing							Modern housing
Land Tenure	Tribal land							
Electricity	National electricity grid							
Religion/Spirituality	Christianity, Islam, Hindi, and Traditional beliefs							
Cultural/Customs	Traditional dance, rites of passage							
Social Issues	School Dropout, Teenage Pregnancy, GBV, SEA, SH, and VAC							
Governance	Tribal and Political Administrations							

Table 50: Summary of Social Baseline for Dukwi Refugee Camp

Population			
Age Cohort	Female	Male	Grand Total
Children (0-14 years)	135	135	270
Children (15-17years)	22	23	45
Youth (18-35years)	107	133	240
Adults (36-65 years)	-	4	4
Grand Total	312	459	771
Predominant Livelihoods	Subsistence farming, backyard gardening, menial jobs, and small businesses		
Poverty Rate	N/A		
Unemployment Rate	N/A		
Ethnic Groups:	Somali, Hutu, Tutsi, Ndebele, Sona, Congolese, Rwandese, Burundian, Eritreans		
Languages	English, Swahili, Lingala, Ndebele, Shona, Kirundu, Kinyarwandwa, Somali, Nyamulenge, French, Luba		
Educational Facilities	One (1) primary school		
Primary School Enrolment Rate	2021 Enrolment Numbers:194		
Pass Rate	2020 Pass Rate: 78.6%		

Health Facility	One (1) Clinic with Maternity, Child Welfare Clinic (CWC), Maternal Child Health (MCH) and Sexual Reproductive Health (SRH), and Anti-retroviral therapy services.
HIV Prevalence:	Twelve (12) patients on ARVs. That represents 1.6% of the total refugee population of 771.
COVID 19 Situation	Sixty-nine (69) positive cases were recorded, and all have recovered
Land Tenure	The Camp site sits on a tribal land, and it measures 1651.1450Hectares
Water and Sanitation	Households connected = 75 Households using standpipes = 75 Total No. standpipes working/ not working = N/A Total Refugee Houses connected with standpipes = 152 <ul style="list-style-type: none"> - 135 working - 17 not working
Housing (Types of Housing)	Staff Houses = 75 staff houses Refugee Housing = N/A
Electricity	The Refugee Camp is connected to the national power grid.
Religion/ Spirituality	Christianity and Islam
Cultures/ Customs	Varied according to ethnicity
Social Issues	<ul style="list-style-type: none"> c) Teenage pregnancy: Six (6) pregnancy cases since May, 2021 to date d) Gender Based Violence (GBV), Sexual Exploitation and Abuse (SEA), Sexual Harassment (SH), and Violence Against Children (VAC) – No records on GBV, SEA, SH, and VAC.
Governance	The Camp is managed by a Camp Manager from Ministry of Defence, Justice and Security. There is also other Heads of Departments in the Camp at Police Station, Clinic and Primary School and UNHCR who form a Camp Management Team.

	Refugees have their own structures, an umbrella Refugee Welfare Committee as well as community level committees.
Aspirations of the community members	To find durable solutions to their plight.

Source: Ministry of Defence, Justice and Security, Botswana, (2021)

5.1 Population Characteristics

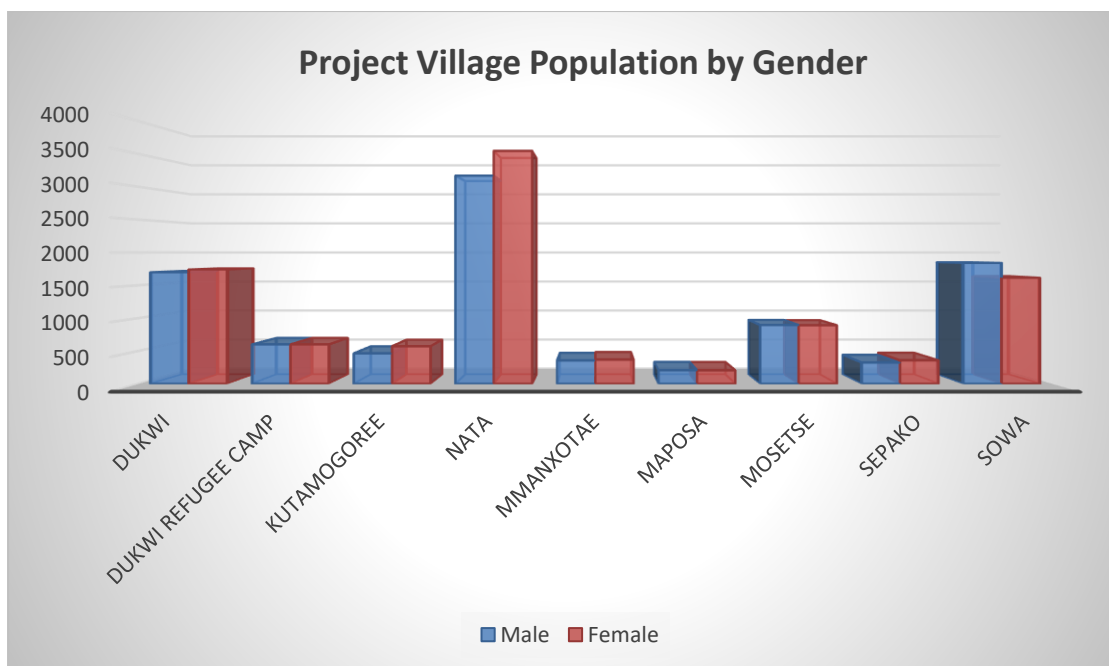
According to the 2011 Botswana Population and Housing Census of Towns and Villages, the total population of project villages was 19,448. The males were 9,551 while females were 9,897 a difference of 346. Many of the project villages had more females than males except Moseitse and Maposa which had more males respectively. Nata has the highest population at 6,714 followed by Sowa with 3,454 while Maposa has the least number of people at 413. The 2011 population was projected by a national figure of 1.9% which brought the total number of people in the project are estimated to be 24,395 for the year 2020. **Table 51** shows population by gender, and 2020 population projection.

Table 51: 2011 Population by Gender and the 2011 Projected to 2020

Village	Population (2011)	Male	Female	2011 Population projected to 2020
Dukwi	3,438	1,698	1,740	4,073
Dukwi Refugee Camp	1,200	600	600	1,200
Kutamogoree	1,035	463	572	2,728
Nata	6,714	3,168	3,546	7,953
Manxotae	725	356	369	762
Maposa	413	207	206	489
Moseitse	1,787	895	892	2,117
Sepako	682	324	358	808
Sowa	3,454	1,840	1,614	4,262
Total	19,448	9,551	9,897	24,395

Source: CSO – Population and Housing Census 2011

According to the 2011 census, the gender ratio in the region was 9:10 that is, there were about 10 females per 9 males. This suggests that women are the dominant gender group. The 2011 Census recorded a ratio of 96 males to 100 females and thus it can be concluded that there is a gradual increase of the gender ratio and women are still dominant. **Figure 23** below shows project villages population by gender.



Source: 2011 Population and Housing Census

Figure 23: Project Villages' Population Data by Gender

5.1.1 Gender

According to the 2011 Population and Housing Census, the population of Tutume Central comprised 19,448 individuals; of which 9,55 were male and 9,897 females. The population was dominated by the youth who represent the 0 to 14-year age group. The male-female composition of the population shows that there is a dominance of females in the project villages. This implies that there are more female headed households in the district.

5.1.2 Ethnicity

The sub-project area villages are predominantly Bakalaka and Basarwa. There are, however, some other ethnic groups in the sub-project area such as Bangwato, Bahurutshe, Barolong, and Batalaote. There are Basarwa in Moseitse, Kutamogoree and Manxotae who meet the criteria of Vulnerable Communities as per World Bank's OP 4.10. Furthermore, the project area hosts the Dukwi Refugee Camp which has provided asylum for about 1,300 refugees and therefore considered as a Vulnerable Community as per World Bank's OP 4.10. The camp has 18 nationalities from as far as Morocco, Somalia, Democratic Republic of Congo (DRC), Burundi, Algeria, Kenya, Rwanda, Namibia, Zimbabwe, and Sierra Leone. The oldest refugee in the camp is from Morocco, who arrived in 1978. The highest number of refugees are from DRC followed by Somalia then Burundi.

5.1.3 Housing Infrastructure

The dwelling huts are made up of mostly natural materials, poles, grass and mud. Individuals who can afford to live in small houses constructed from modern building materials, cement bricks, timber and corrugated iron sheets are few. Most of the yards are not fenced and where there is fencing it is just poles cut from trees and some lines of wire, not the commonly used diamond mesh and metal poles.

5.1.4 Vulnerable Communities in the Project Area

Botswana is a culturally diverse country. Its Constitution initially recognized eight major tribes. However, several other ethnic groups have recently obtained such official recognition. Although most of these groups claim to be aboriginal or indigenous to Botswana and many of them live in marginal conditions and are considered vulnerable, there is little doubt that the Basarwa have been historically excluded for their distinct cultural characteristics and that affirmative action is necessary to ensure their survival.

The consultations identified the vulnerable communities of Basarwa in the project area and they reside in Kutamogoree, Moseitse and Manxotae. Basarwa reside in the most remote rural settlements, where there are few livelihood options apart from depending on Government handouts such as Food Ration, Livestock Management, and Infrastructure Development (LIMID), Poverty Eradication Programme, Presidential Housing Appeal Scheme, Old Age Pension and Ipelegeng. The other form of livelihood is employment on cattle posts/ farms as labourers.

According to the Basarwa consulted they have indicated that they face considerable social and cultural discrimination for example, they are side-lined during hiring as people perceive them as unskilled and they have a tendency of absconding from work and other cultures do not consider Basarwa culture as a recognisable culture hence making them less important in the society. The employment relationship is highly exploitative, and they are paid very poorly which is below the minimum wage of P5.46 per hour and sometimes nothing at all. Government of Botswana always advise the employers to adhere to the set policies by ensuring that they do not pay their employees below the stipulated new minimum wage rates. Failure to do so will be violation of Section 1389 of the Employment Act Cap. 47:01. the offence is punishable in terms of Section 151 of the same act. Despite the revision Botswana Federation of Trade Unions (BFTU) says the new minimum wage rates do not match living expenses and it proposes a living wage rather than a minimum wage. This poorly paid wages make it difficult for cattle post laborers, settlement or slum dwellers, mostly Basarwa to live at or below the Poverty Datum Line.

According to research, the Botswana government believes that marginalization of the Basarwa is not related to their ethnic status. But official policies promote sedentarization, acculturation and assimilation, discouraging traditional Basarwa lifestyle. According to the interviews Basarwa indicated that since their relocations from Central Kalahari Game Reserve¹² (CKGR) they have lost their customary hunting land to expanding cattle farmers and small stock which are now dead due to lack of adequate water or theft. Although they did not dismiss efforts by the Government extended to them through existing development schemes though they take time, and the output is not what they anticipated.

5.1.5 Nature of Projects on the Basarwa

The Basarwa are the first inhabitants of Southern Africa, including Botswana. The Bantu-speakers found them occupying most parts of this region as nomadic communities. Basarwa's interaction with the politically powerful Bantu-speakers resulted in their marginalisation and exclusion. Thus, the Basarwa were slowly pushed away into the inaccessible and rough terrains, the Kalahari Desert. The Basarwa were and still are looked down upon by the mainstream communities in Botswana, and elsewhere in Southern Africa. This has resulted in them losing their ancestral lands to the expansionist and cattle-farming groups, and to the state-sanctioned development projects, such as mining and

¹² A game reserve in central Botswana established in 1971 to protect its series of pans, dry river valleys and game. The game reserve was traditionally inhabited by Basarwa and Bakgalagadi.

infrastructure development. The failure by the modern or western inspired education system to cater for the Basarwa, considering their language, culture and way of life, has further compromised their well-being, and, thus, left them largely a charity case (Thapelo, 2003).

Basarwa have lived in the Nata area, which includes Kutamogoree, Manxotae and Mosetse, for centuries in peace and harmony with nature until their contact with European trophy hunters in the early 1860s, and later the Bangwato. The latter group became Basarwa's self-declared landlords or masters. Initially, Basarwa never imagined Bangwato being their masters or landlords. They viewed them as sophisticated hunting partners. Gadibolae (1985:25) says that the 'formal' contacts between the two groups began in the 1860s, when Bangwato organised hunting expeditions into the Nata area, looking for the prized elephant tusks, ostrich feathers and kerosses. Many African communities had enthusiastically responded to the globalised ivory trade, spearheaded by the Griquas in Southern Africa. The Griquas had moved into what is today Botswana, from the Cape Colony, at the beginning of the 1800. They recklessly killed thousands of elephants, using guns, to harvest their tusks (ivory), which was in high demand in Asia and Europe (Tlou & Campbell, 1997: 173-176). Despite the reckless destruction of wildlife, the Griquas were later joined by some Tswana groups, especially the Barolong and Batlhaping, who became long-distance wagon traders.

5.1.6 Social Inclusion of Women, Youth and Marginalized and Disadvantaged Groups

a) Gender and Gender-Based Violence (GBV)

Gender Based Violence (GBV) is an emerging social issue in Botswana. GBV is deeply rooted in gender inequality, and while both women and men experience gender-based violence, most victims are women and girls.

A study by the Women Affairs Department and NGO Gender Links Botswana states that over two thirds of women in Botswana (67%) have experienced some form of gender violence in their lifetime, including partner and non-partner violence. A smaller, but still high, proportion of men (44%) admit to perpetrating violence against women.¹³ The same study also noted that nearly one third of women (29%) experienced violence perpetrated by an intimate partner in the 12 months prior to the prevalence survey. In contrast, only 1.2% of women reported cases of GBV to the police in the same period. Thus, the prevalence of GBV, SEA, SH and VAC reported in the survey is 24 times higher than that reported to the police. This suggests that levels of GBV are far higher than those recorded in official statistics.

In the rural areas, GBV, SEA, SH and VAC prevalence tends to be higher and are often influenced by community and societal factors such as cultural or traditional norms, and underlying social and economic conditions, as well as individual factors (substance abuse, age, income, education, etc.) however, these occurrences are often not reported to the authorities. Given the situational context for GBV, SEA, SH and VAC risk, there is need for periodic education on GBV, SEA, SH and VAC prevention to the workers and community members during construction.

¹³ Government of Botswana (Ministry of Labour and Home Affairs and Women Affairs Department) and Gender Links (2012). "Gender Based Indicator Study <http://www.gov.bw/globalassets/mlha/gender-affairs/final-gbv-indicators-study-pamphlet--botswana.pdf>. See also, Management Sciences for Health (MSH) Botswana (2014) "Gender Based Violence in Botswana". <https://www.hivsharespace.net/sites/default/files/resources/MSH%20Fact%20Sheet%20Botswana%20GBV%20Oct%202014%20web.pdf>

GBV, SEA, SH and VAC is deeply rooted in gender inequality embedded in patriarchal norms, and while both women and men experience gender-based violence, most victims are women and girls. GBV, SEA, SH and VAC can cause economic, physical, social, and emotional harm to an individual, for example, through property damage and restriction of access to resources, impact their personal health and safety, can lead to social exclusion, and foster dependency on their partners for all material needs which can often perpetuate the cycle of violence.

The duty to fetch water is mostly done by women in the project area and they use 20 litres buckets to carry on their heads except for those who own wheel-burrows and donkey carts. The latter ones use 25 litres sealed containers and carry two or more containers at a time and push the wheel-burrow, but if it is a donkey cart, they must direct the donkeys that are pulling the cart in the right direction. Men also do assist in fetching water when they are available at home, and they mostly use wheelburrows and donkey carts.

Scarcity of water means that women spend more time fetching water instead of concentrating on their home chores of cleaning, washing clothes, cooking, caring for the sick and people with disabilities. The issue of time management was raised during consultations by women, that they spend more time fetching water to store than on their homely chores.

A GBV, SEA, SH and VAC Action Plan that includes mitigation measures, a process in the project's GM for survivor centred GBV reporting, and a GBV referral pathway for services for survivors of GBV has been developed and a GBV, SEA, SH and VAC Specialist will be reporting for duty in May 2022 and her role will be to monitor the implementation of the GBV, SEA, SH and VAC Action Plan in the portfolio sub-projects. In view of the above, this sub-project will provide special consideration to employ women during civil works to help empower them and provide economic independence. It will also develop a GBV, SEA, SH and VAC Action Plan that includes mitigation measures, a process in the project's GM for survivor-centered GBV reporting, and a GBV referral pathway for services for survivors of GBV.

b) *Other Vulnerable and Disadvantaged Groups*

The sub-project area hosts the Dukwi Refugee Camp which is providing asylum for about 771 refugees and therefore considered as Other Vulnerable and Disadvantaged Group. The camp has 18 nationalities from as far as Morocco, Somalia, Democratic Republic of Congo (DRC), Burundi, Algeria, Kenya, Rwanda, Namibia, Zimbabwe, and Sierra Leone. The oldest refugee in the camp is from Morocco, who arrived in 1978. The highest number of refugees are from DRC followed by Somalia then Burundi.

History of Dukwi Refugee Camp (DRC), Botswana

During the height of the liberation struggle in Southern Africa, Botswana received and sheltered hundreds of refugees from its troubled neighbours, South Africa, Southern Rhodesia (Zimbabwe), Angola and Namibia. Some of these refugees, mainly from South Africa and Zimbabwe, were on transit to East Africa and even overseas, for military training and educational opportunities, or for safety (Sanoto, 1992; Mabikwa, 2000; Morapedi, 2012). Facing an avalanche of hopeless and vulnerable refugees, the Government of Botswana, in consultation and support from the United Nations High Commissioner for Refugees (UNHCR), established the Dukwi Refugee Camp (hereafter DRC) in May 1978. The main reason why Botswana had received so many refugees was because of its political and economic stability, admit a very chaotic region. The country is also located in the heart of Southern Africa, making it a safe passage to faraway places (Parsons, 2008). The Dukwi camp and the two

temporary camps in Francistown and Selibe- Phikwe were also financially assisted by international donors and humanitarian organisations. In Botswana, the hosting of refugees and alyssum seekers dates to the early 1900s. In 2021, the country still hosts refugees from the Southern African region, the Great Lakes region, and the Horn of Africa. Most of these are hosted at the DRC, which is located some 130 kms from Francistown, the second longest city in Botswana (Majaha, 2016).

To show its commitment to protecting and safeguarding the interests of refugees, Botswana ratified the 1951 United Nations (UN) Convention relating to the status of refugees (hereafter the 1951 Convention). It also came up with the 1967 Protocol. Botswana is a signatory to the 1969 Organisation of African Unity (OAU) Convention, which deals with some aspects of refugees' problems in Africa (Majaha, 2016). Despite its commitments and ratifications of laws, Botswana has reservations to Articles 7, 12 (1), 17, 26, 31 and 34 of the 1951 Convention. For instance, the Botswana Refugees and Control Act of 1968 puts some restrictions on the freedom of movement and access to employment by refugees. Thus, the camp is officially classified as a restricted area (Majaha, 2016). Some have argued that such restrictions should only be applied the moment the refugees arrive in their host countries for national security reasons and their own safety.

However, after it was established in May 1978 under the auspices of the 1968 Refugees Control and Recognition Act. It is under the Ministry of Justice, Defence and Security, and is overseen by the Settlement Commandant seconded from the same ministry. But the UNHCR jointly runs it with the assistance from other partners, and the elected refugee leaders. The Refugees Control and Recognition Act requires refugees to reside in a specific camp and settlements designated by the host government. However, refugees can be exempted from this requirement under certain circumstances, and with permission from the host government (Majaha, 2016).

Since the Government of Botswana was concerned about national security, the need to establish a permanent camp was urgent (Southall, 1984). Thus, it followed the unprecedented influx of refugees from the region and beyond. The DRC is located some 130 kms from Francistown, as already noted. This camp became the first and only permanent settlement camp established in Botswana. The other two were transit camps located in Francistown and Selebi-Phikwe (Southall, 1984; Majaha, 2016). Botswana has a long history of hosting refugees from war-ravaged countries. Historically, it hosted the Herero, who fled German persecutions in the early 1900s, and some are now citizens of Botswana.

A UNHCR report of 2015 distinctly raises concerns of GBV, prostitution and children abuse within refugee camp, the incoming GBV, SEA, SH, and VAC Specialist will be briefed to ensure that the GBV, SEA, SH, and VAC Action Plan and CoC are clear concerning the camp and ensure that she prioritizes the Dukwi Refugee Camp in capacity building of its workers on GBV, SEA, SH, and VAC issues. Other social issues such as HIV/AIDS, COVID-19, alcohol, and substance abuse will also be prioritized in capacity building for this community.

c) *Violence Against Children (VAC)*

Violence Against Children (VAC) is defined as physical, sexual, emotional and/or psychological harm, neglect, or negligent treatment of minor children (i.e., under the age of 18), including exposure to such harm, that results in actual or potential harm to the child's health, survival, development, or dignity in the context of a relationship of responsibility, trust, or power. This includes using children for profit, labour, sexual gratification, or some other personal or financial advantage. This also includes other activities such as using computers, mobile phones, video, and digital cameras or any other medium to exploit or harass children or to access child pornography.

The following risks exacerbates the possibility of VAC and harm to children more generally:

- Employing children below the age of 14 years by the Contractor and allowing children to sell to the workers during school hours. Botswana's Employment Act defines the minimum age of employment as 14 years, *when the child is not attending school*. The Act states that he/she may be employed on *light work not harmful* to his/her health and social development. The child should work for a maximum of six hours a day and 30 hours a week. While adults work for eight hours a week and not more than 48 hours a week.
- Using children for personal or financial advantage by both contractors and employees.
- Harassing children, including sexual exploitation and physical or sexual violence.
- Putting children's health and safety in danger by not protecting trenches that are close to where they play in their homes and within the built-up area.

The Children's Act, 2009 is the principal law for the protection of all children in Botswana and it defines a child as anyone who is below the age of 18 years. This sub-project will not employ children under the minimum age of 14 and will be monitored to ensure compliance. In addition, to strengthen and protect children against possible violence, the *Codes of Conduct and Action Plan for Implementing ESHS and OHS Standards, and Preventing Gender Based Violence (GBV), Sexual Exploitation and Abuse (SEA), Sexual Harassment (SH) and Violence Against Children (VAC)* will be rigorously applied and will be included in the Contractor's ESMP.

d) Youth in Beneficiary Villages (Including Youth of Vulnerable Communities)

According to Statistics Botswana, 2011 Population and Housing Census, the total youth population (that is the age cohort between the ages of 18 - 35 years) is estimated at 26%. Most of the unemployed are the youth and particularly those just coming out of school. The challenges they face include limited job opportunities, inadequate employable skills, and limited access to productive assets particularly those in the vulnerable communities.

The high rate of unemployment causes frustration, dejection, desperation and dependency, and the situation has left the youth in a vicious cycle of poverty that daily erodes their confidence and hopes for a prosperous and meaningful future. Consequently, they tend to abuse alcohol and drugs and thus are increasingly being involved in crime and delinquency. The implementation of this project should facilitate employment to the youth, both men and women.

5.2 Education

The beneficiary villages have a total of 10 primary schools; 2 are in Nata, and the other 2 are in Sowa. There are 3 junior schools in the project area, 1 is in Dukwi, another one in Nata, and the third one in Sowa. There is 1 senior secondary school located in Nata.

5.3 Economy, Livelihoods and Poverty

5.3.1 Employment

The employment sectors in Botswana include Central Government (25.7%); Local Government (23.1%) which is mostly Ipelegeng (Labour-based Public Works Programme); Private (46.5%) and Parastatal (4.7%) and these include Agriculture, Mining and Quarrying, Manufacturing, Electricity and Water, Construction, Wholesale and Retail Trade, Transport and Communication, Finance, Real Estate, Education, Health, and Other Community.

Manxotae has the highest unemployment rate followed by Kutamogoree and Nata (Table 47). Sepako has the lowest unemployment rate. Overall unemployment for the project villages was estimated at 12.0%. According to Botswana Multi-Topic Survey Quarter 4 (2020) Labour Force Module, there are 7,117 males, and 13,468 females employed in the entire Central Tutume District, which the project villages fall under. This indicates that more females are employed compared to males. **Table 52** shows employment status by village and sex in Central Tutume District.

Table 52: Employment Status by Village and Gender in Central Tutume District

Village	Employed			Job Seekers			Labour Force			Unemployment Rate (%)		
	Male	Female	Total	Male	Female	Total	Male	Female	Total	Male	Female	Total
Dukwi	980	519	1499	242	190	432	1969	184	3793	12.3	10.4	11.4
Kutamogoree	94	108	171	60	52	100	200	300	500	30.0	17.3	20.0
Nata	1083	724	1807	301	276	577	2270	2495	4765	13.3	11.1	15.3
Manxotae	71	45	116	72	35	107	167	171	338	43.1	20.5	31.7
Maposa	102	70	172	9	4	13	163	188	351	5.5	2.1	3.7
Mosetse	540	208	748	52	41	93	704	576	1280	7.4	7.1	7.3
Sepako	100	72	172	10	3	13	160	191	351	5.2	5.1	3.7
Sowa	1114	612	1726	94	156	250	1208	768	1976	7.8	20.3	12.7

Source: Tutume Sub-District Population and Housing Census, Selected Indicators, 2011

5.3.2 Mining

Although mines form a small proportion of the project area, they significantly contribute to the area and Botswana's economic profile. Mines in the project area include Mowana copper mine near Dukwi, and the soda ash mine in Sowa. While the spatial footprint of the mines is limited, the mines have an impact on the area, through employment, house rentals, and corporate social responsibility.

Soda ash mining in the area generates a direct value of P190 million (**Table 53**) to the gross national income and some 440 people are employed, with a wage bill of some P99 million. Employment in the mining industry is therefore relatively highly paid compared with that in tourism and even more so compared with that in agriculture. With a multiplier factor of 2.46 as well as the backward linkages, the value of mining activities on the national income is estimated at P467 million.

Table 53: Direct Economic Values for Mining (Pula million/annum, 2010)

Category	Capital Investment	Gross Output	Gross Value Added
Mining (Soda Ash and Salt)	458,000,000	528,500,000	190,000,000

Source: Makgadikgadi Framework Management Plan, 2010

5.3.3 Tourism

Tourism development in the Sowa region appears to be on the increase due to the availability of several tourism sites which have different tourism products or resources that appeal to tourists, such as Makgadikgadi Pans, Sua pan, baobabs, flamingos, landscape, Dukwi Coal mine and Soda Ash mine.

Soda Ash mine is found within the Makgadikgadi Pans area. Biodiversity is conserved in the Makgadikgadi and Nxai Pan National Parks. Many heritage archaeological sites are found in the area, particularly in the south-eastern part and along the Boteti river. The Mosu escarpment in the south of Sowa Pan is seen as one of the most important archaeologically sensitive areas in the Makgadikgadi area. Kubu Island is also an attractive cultural site found within the Makgadikgadi Pans. In the south-eastern part of the Makgadikgadi is the Mmatshumo settlement which has developed a community campsite at Kubu Island centred on its attractive, wide salt pan landscapes, the community use it for rituals and prayers.

Tourism in the project area is primarily undertaken through the private sector with small to medium sized safari camps and serviced lodges dominating the industry. Some land is allocated to communities for community based natural resource management (Xhauhwatubi Development Trust; Nata Sanctuary: Nata Conservation Trust; and Lekhubu: Gaing-O Community Trust).

Botswana Tourism Organisation in association with Skydive Botswana and Nata Bird Sanctuary collaborate every year to host the Makgadikgadi Epic. This event takes place in the premier and prominent Makgadikgadi Salt Pans, and precisely, in the Nata Bird Sanctuary. Makgadikgadi is synonymous with awesome birding experiences and open natural landscapes that will be a marvel from any view, be it from the ground or above. Makgadikgadi has beautiful and breathe taking views, thus making it the best choice for skydiving. The main objective of the event is to give tourists/travellers a lifetime unique experience.

Nata village has 11 accommodation facilities (**Table 54**) such as lodges and guesthouses, Sowa has only 1 lodge. Many transit tourists visit Makgadikgadi Pans, Okavango Delta, and Sua Pan as

refreshment and resting centres. As shown in **Table 54**, most of tourism facilities are located in Nata which indicates that the village has good potential for further growth.

Table 54: Accommodation Facilities in Nata and Sowa

Establishment Name	Facility Category	Location	Grade
Makgadikgadi Lodge	Game lodge	Sowa	2 Star
Nata Lodge	Game lodge	Nata	Ungraded
Nata Guest Inn	Guesthouse	Nata	Ungraded
Northgate Lodge	Game lodge	Nata	1 Star
African Bush Safaris	Camp site	Nata	Ungraded
Pacific Conquer Self Catering	Guesthouse	Nata	Ungraded
Rooiputs Lodge	Game lodge	Nata	Grade Pending
Dzibanani Hotel & Camping	Game lodge	Nata	1 Star
Khayelihle Guesthouse	Bed and Breakfast	Nata	2 Star
Maya Guest Inn	Guesthouse	Nata	Ungraded
Diggers Inn	Selected Service Hotel	Nata	2 Star
Woodlands Stop Over & Lodge	Self-catering establishment	Nata	3 Star

Source: Botswana Tourism Organization Website

5.3.4 Social Protection - Labour-Based Public Works Drought Relief Program (Ipelegeng)

According to Policy Position Paper on Social Security and Social Protection in Botswana (2007), Ipelegeng was started in the 1960s as a poverty eradication strategy coordinated from the Office of the President. Its main objective is provision of temporary employment to community members throughout Botswana through momentary supplement to their incomes through wages. Unemployed community members register with the program and are offered temporary manual work on a rotational basis to work for six hours and earn P547 (US \$54.70) per month. The rotation is on a three-month basis and thereafter beneficiaries receive nothing for the subsequent months as they are laid off to make way for others due to the rotational system of employment under this programme. A lot of community members throughout the villages reported this programme as main source of income.

5.3.5 Livelihoods

The predominant livelihood in the project villages is subsistence agriculture. The communities of Manxotae and Kutamogoree are heavily dependent on the government Social Safety Nets provided for under the Remote Area Development Policy (2009), which are mainly designed for the poorest people in the remote areas and Basarwa residing in the established villages. Manxotae and Kutamogoree settlements have very limited livelihoods and employment opportunities, with this situation and the standard of living for the Basarwa, it is important to ensure that the impacts of sub-project implementation does not perpetuate their situation, impoverish them further and erodes their dignity, norms and values.

During consultations the community indicated that the resources that are mostly found in the project area from which communities derive a living are through harvesting mopane worn (*Gonimbrasia belina*), *Mogwana* (*Grewia Monticola*) and collection of thatching grass and firewood. They further stated that *Mogwana* fruits are sold and can also be used to make traditional beer (*khadi*).

Besides these, Mosetse, Manxotae and Kutamogoree (Vulnerable Communities, VC) mostly rely on government temporary employment programme called Ipelegeng (labour based public works programme) and other social safety nets like Old Age Pension, Poverty Eradication Scheme, Back Yard

Garden, Food rations and Livestock Management and Infrastructure Development (LIMID) for sustenance.

5.3.6 Agriculture

The project area is sparsely populated with people from different backgrounds and cultures. However, the livelihood challenges are similar. Households depend on a number of livelihood sources the major one being agriculture which is undertaken primarily for subsistence purposes.

Arable farming

Arable farming in the area is characterised by the growing of traditional crops such as sorghum, millet, maize meal, watermelons, beans, and sweet reeds mainly for subsistence purposes. Arable farming in the project area is significantly assisted by government through the provision of farm implements, seeds and technical advice. The government has put in place poverty eradication as well as youth development programs from the agriculture sector aiming towards self-sufficiency. Such programs include, CEDA young farmer's fund, backyard gardening, and the Integrated Support Programme for Arable Agriculture Development (ISPAAD) to address challenges facing arable farmers.

Pastoral farming

Pastoral farming in the project area is dominated by traditional production systems characterized by continuous grazing of livestock in communally shared land. Cattle and goats are the main livestock species reared. Other livestock reared include sheep and donkeys. Livestock is an important component of rural livelihoods as it provides cash income, meat, milk, draught power, skin, source of wealth, and prestige. Large herds of livestock are usually kept at the cattle posts while small herds are kept in the village area. The main cattle breeds kept are the Tswana cow and the Brahman bull. Because both are local breeds and are resistant to diseases like foot and mouth. Some animals have been cross-bred to produce higher breeds of animals. The government supports the subsistence farmers by helping them to control pests and diseases by spraying the grazing areas.

5.3.7 Poverty

According to Statistics Botswana (2010), amongst the beneficiary villages, those with the highest poverty levels are Manxotae and Kutamogoree settlements **Table 55**. These are higher than the national poverty rate of 16.3%. The high poverty levels could be due to the high unemployment levels as nearly 90% of residents are employed in the temporary government work program, Ipelegeng (labour public works program) where those enrolled in the program are paid a monthly wage for a two-month duration of the work program.

Table 55: Estimated Disaggregated Poverty Rates at Village Level

Village	Population (2011)	Number of households	Poverty rate
Dukwi	3,438	1729	0.247
Kutamogoree	1,200	296	0.28
Nata	1,035	1830	0.288
Manxotae	6,714	142	0.421
Maposa	725	155	0.326
Mosetse	413	734	0.129
Sepako	1,787	185	0.4
Sowa	682	1478	0.033

Source: Statistics Botswana: Mapping Poverty in Botswana, 2010

5.4 Land Tenure and Land Use

5.4.1 Regional Land Tenure

Tutume Sub-District falls within the tribal land tenure type; hence by extension most of the proposed project area also falls within tribal land which is administered by the Land Board. However, Sowa Town by virtue of being a town falls within the State Land Tenure under the administration of the Department of Lands. The BotAsh mine and the Nata Sanctuary are part of the Makgadikgadi Pans National Park which is under state land.

5.4.2 Regional Land Use

The mainland in the project area and villages is tribal land which is composed of residential, commercial, arable, and mixed uses all administered by Ngwato Land Board through the Sub-Land Boards at Nata and Tutume. The other land system is state land which is administered by the department of Lands. Sowa Town, BotAsh Mine, Nata Sanctuary and Makgadikgadi Pans National Parks are all state land.

The main project components which are the pipeline routes will require land from the road reserves which are part of state land and wayleaves will be applied for through the Department of Roads. The storage tanks and pump stations will all require application through the Ngwato Land Board through the Sub-Land Boards in Nata and Tutume.

5.4.3 Resettlement

There will be no acquisition of private property, public lands are free of encumbrances (i.e., no squatters and encroachers), and the pipes will go through the roads reserve. If some encroachments are realized, the necessary consultations will be done with the project affected persons and they will be duly compensated guided by OP 4.12 and the Resettlement Policy Framework of 2017.

5.4.4 Scope of Land Acquisition

A separate Resettlement Action Plan (RAP) will be prepared for this sub-project as it has several anticipated land acquisition issues which entail land acquisition for all the pipeline servitudes, storage tanks and pump stations as outlined by **Table 56**. A 5m pipeline servitude will be required to connect the Dukwi Waterworks with various villages of the scheme to transfer the water from the Dukwi Wellfield. This will be undertaken through application for way-leaves through the Department of Roads.

The water storage tanks, and pump stations will both require land acquisition which will require direct application for land through the Ngwato Land Board via the relevant Sub-Land Boards. The proposed sites are within tribal land and therefore under the jurisdiction of Ngwato Land Board. The Nata reservoir tank will require additional land to accommodate the reservoir tank and hence an application for extension of the current plot will be made through the Nata Sub-Land Board.

Table 56: Land Required for the Sub-Project

Description	Location	Required Size	Responsible Land Authority (Tenure)	Current Land Use
Proposed Storage Tanks and Pump Stations				
Nata Reservoir and Pump Station	Nata	Existing plot 1763 m ² , extra land 2189 m ² and total land required 3952 m ²	Ngwato Land Board (Tribal land)	Vacant tribal land while existing plot is used for the elevated tanks
Kutamogoree Elevated Tank	Kutamogoree	408 m ²	Ngwato Land Board (Tribal land)	Tribal land
Dukwi East Elevated Tank	Dukwi	900 m ²	Ngwato Land Board (Tribal land)	Tribal land
Dukwi Village Elevated Tank	Dukwi	616 m ²	Ngwato Land Board (Tribal land)	Tribal land
Nata Elevated Tank	Nata	900 m ²	Ngwato Land Board (Tribal land)	Tribal land
Manxotae Elevated Tank and Pump Station	Manxotae	900 m ²	Ngwato Land Board (Tribal land)	Tribal land
Dukwi Waterworks Pump Station	Dukwi Waterworks	Within the existing plot	Ngwato Land Board (Tribal land)	Land used for Dukwi Waterworks
Mosetse East Pump Station	Mosetse	967 m ²	Ngwato Land Board (Tribal Land)	Tribal land
Proposed Pipelines				
Dukwi Waterworks to Dukwi Village rising main	Between Dukwi Waterworks and Dukwi	12.2 km pipeline with a 5 m wide servitude	Department of Roads (State Land)	Reserved or planned land within the road reserve for laying of utilities such as water pipes, power, sewerage, telecommunication lines
Take-Off from Dukwi Waterworks to Dukwi Village rising main to the Dukwi Refugee Camp elevated Tank	Between Dukwi Waterworks, Dukwi and Dukwi Refugee Camp	Pipeline with a 5 m wide servitude	Department of Roads (State Land)	Reserved or planned land within the road reserve for laying of utilities such as water pipes, power, sewerage, telecommunication lines

Description	Location	Required Size	Responsible Land Authority (Tenure)	Current Land Use
Dukwi Village to New Dukwi East Elevated Tank rising main	Dukwi	6.8 km pipeline with a 5 m wide servitude	Department of Roads (State Land)	Reserved or planned land within the road reserve for laying of utilities such as water pipes, power, sewerage, telecommunication lines
New Dukwi East Elevated Tank to Moseitse West and Moseitse East gravity main	Between Dukwi and Moseitse	9.8 km pipeline with a 5 m wide servitude	Department of Roads (State Land)	Reserved or planned land within the road reserve for laying of utilities such as water pipes, power, sewerage, telecommunication lines
Moseitse East to Kutamogoree rising main	Between Moseitse and Kutamogoree	28.2 km pipeline with a 5 m wide servitude	Department of Roads (State Land)	Reserved or planned land within the road reserve for laying of utilities such as water pipes, power, sewerage, telecommunication lines
Dukwi Waterworks to Sowa System gravity main	Between Dukwi Waterworks and Sowa Town	22 km pipeline with a 5 m wide servitude	Department of Roads (State Land)	Reserved or planned land within the road reserve for laying of utilities such as water pipes, power, sewerage, telecommunication lines
Dukwi Waterworks to Nata System gravity main	Between Dukwi Waterworks and Nata	48.4 km pipeline with a 5 m wide servitude	Department of Roads (State Land)	Reserved or planned land within the road reserve for laying of utilities such as water pipes, power, sewerage, telecommunication lines
Nata to Manxotae rising main	Between Nata and Manxotae	33.7 km pipeline with a 5 m wide servitude	Department of Roads (State Land)	Reserved or planned land within the road reserve for laying of utilities such as water pipes, power, sewerage, telecommunication lines
Manxotae Elevated Tank to Sepako gravity main	Between Manxotae and Sepako	27.9 km pipeline with a 5 m wide servitude	Department of Roads (State Land)	Reserved or planned land within the road reserve for laying of utilities such as water pipes, power, sewerage, telecommunication lines

5.5 Health

In Botswana, healthcare is delivered through a decentralized system with primary health care being the pillar of the delivery system. Botswana has an extensive network of health facilities (Referral hospitals, District hospitals, Primary hospitals, clinics, health posts, mobile stops) spread over the twenty-seven (27) health districts. Central Tutume District has the lowest proportion of its inhabitants (16%) residing between an 8 and 15 km radius of the health facility, and 84% within 5 km radius from health facility (Health Statistics Report 2010). According to Tutume District Health Management Team, the project villages have 9 clinics; 2 are in Dukwi. The project villages do not have a hospital which means they go to Tutume Primary Hospital for services that are not offered in the clinics. Complicated cases are then transferred to Nyangabwe Referral Hospital in Francistown.

The **Table 57** indicates notifiable diseases by type and health in Central Tutume District.

Table 57: Diseases by Type and Health in Central Tutume District

Malaria Confirmed	Typhoid Fever	Diarrhea (some dehydration)	Diarrhea (severe dehydration)	Diarrhea (with Blood)	Suspected Measles	Rabies Exposure
11	22	161	755	151	335	0

5.5.1 Status of Malaria in Tutume Central District

Malaria is spread by insect vectors; the mosquito, the proliferation of which is highly influenced by climatic and environmental conditions. Most of malaria in Botswana is caused by the malignant *Plasmodium falciparum* sporozoites and the *Anopheles arabiensis* mosquito is the only vector. (Government of Botswana, 2009). The prevalent disease vector is *Anopheles Arabiensis* mosquito which transmits the malaria parasite (*Plasmodium falciparum*). The vector breeds in sunlit fresh water, and feeds both indoors and outdoors. The vector also rests indoors and outdoors making its control very difficult. The spraying of mosquito vector using dichlorodiphenyltrichloroethane (DDT) chemical is undertaken during the malaria season. **Table 58** shows malaria cases by district for the period 2011 to 2017.

Table 58: Malaria Cases by District (2011-2017)

	2011	2012	2013	2014	2015	2016	2017
Tutume	60	19	15	19	4	23	47

5.5.2 COVID-19

As of 18th February 2022, there were 263,950 confirmed cases of COVID-19, 193 new positive tests, 1897 active cases, 2,619 coronavirus-related deaths reported in the country since the pandemic began (**Figure 24**). Since the start of vaccinations in March, 1,157,321 persons have been fully vaccinated whereas 1,419,857 received the first dose, and 158,470 received boosters. 92.8% of the eligible population has received their first dose while 75.6% are fully vaccinated (**Figure 25**). The sub-project is located in the greater Francistown Zone, according to the map below the region has less than 10 people per 100,000 persons COVID-19 cases (green color in the legend).

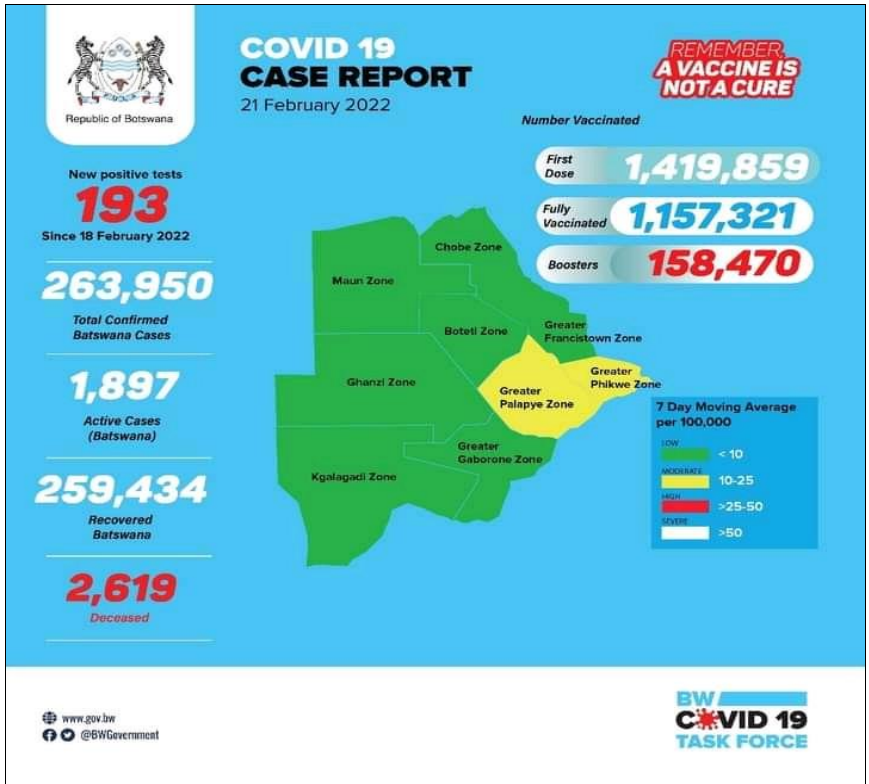


Figure 24: COVID-19 Case Report for Botswana

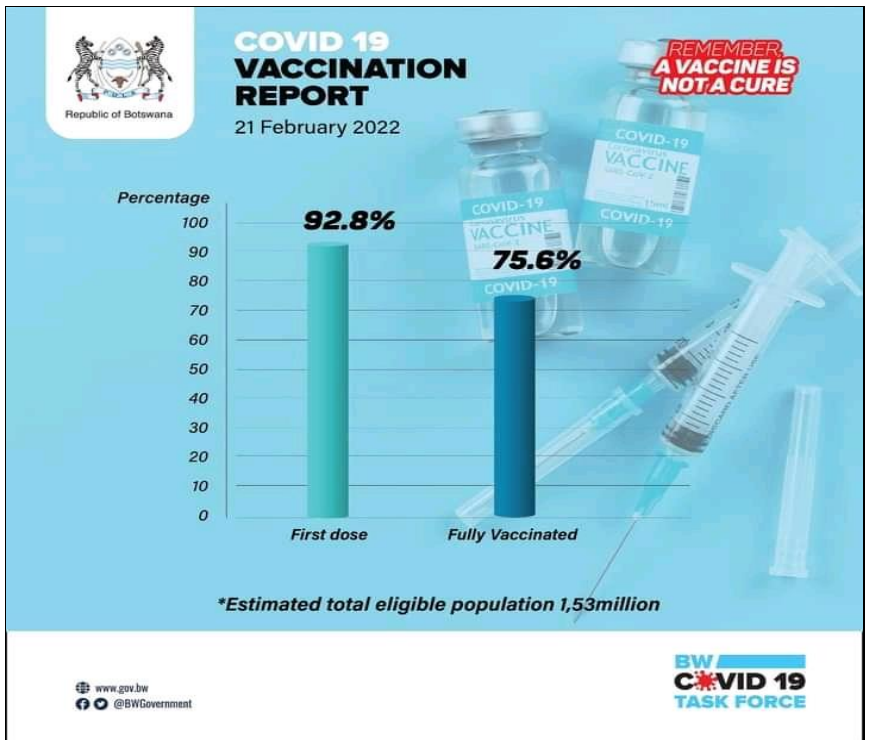


Figure 25: Percentage Number of Vaccinated People in Botswana

In May 2020, Botswana was divided into nine coronavirus zones: Boteti, Chobe, Ghanzi, Greater Francistown, Greater Gaborone, Greater Palapye, Greater Phikwe, Maun, and Kgalagadi. The project area falls under Greater Francistown; as of February 21, 2022, the zone had weekly averages of less than 10 cases.

Measures currently used to contain the spread of the virus

The following transmission and protective measures have been imposed to prevent the spread of COVID-19:

- Maintain a safe distance from others, even if they do not appear to be sick.
- Wear a mask in public, especially indoors or when physical distancing is not possible.
- Choose open, well-ventilated spaces over closed ones. Open a window if indoors.
- Clean your hands often. Use soap and water, or an alcohol-based hand rub.
- Get vaccinated when it's your turn. Follow local guidance about vaccination.
- Cover your nose and mouth with your bent elbow or a tissue when you cough or sneeze.
- Stay home if you feel unwell.

If a person is a suspect, probable, contact or confirmed COVID-19 case, the following necessary steps are required:

- Institutional quarantine
- Home quarantine
- Institutional isolation
- Home isolation

All contacts of confirmed or probable cases will be subjected to 10-14 days quarantine. During the 10-14 days quarantine period the individual should not leave their room and no visitors are allowed. A certificate of release will be signed and issued at the end of the quarantine period.

5.5.3 HIV/AIDS

Botswana has one of the highest HIV prevalence rates in the world with latest reports from 2013 BAIS IV estimating it to be 18.5% of the general population aged 18 years and above (Statistics Botswana, 2013) compared to 17.6% in the 2008 BAIS III. The adjusted incidence rate for the 2013 BAIS IV was 1.35% compared to 1.45% in 2008 BAIS III. This current HIV prevalence for Botswana translates to 378,464 HIV positive persons out of an estimated population of 2,045,752 (Statistics Botswana, 2013). The HIV prevalence rate shows gender disparity with more females (20.8%) compared to males (15.6%) being HIV positive. HIV prevalence also varies by location. About 19.2% of urban population (Cities, Towns and Urban villages) compared to 17.4% of the population in rural areas are HIV positive (Statistics Botswana, 2013). Central Tutume District had an HIV prevalence of 18.9% in 2004, 20.0% in 2008, and 16.5% in 2013. The year 2013 had the lowest HIV prevalence rate whereas 2008 had the highest prevalence rate. **Table 59** shows HIV prevalence and differences in HIV prevalence rates (%) over the years 2004, 2008 and 2013.

Table 59: HIV Prevalence from 2004 to 2013

Year	2004	2008	2013
Prevalence Rates %	18.9	20.0	16.5

Source: Botswana AIDS Impact Survey IV, 2013

5.5.4 Status of Nutrition

Malnutrition contributes to too many diseases in both adults and children, and it is particularly affecting developing countries. A study undertaken in 2006 entitled “Factors Affecting Prevalence of Malnutrition among Children Under three years of age in Botswana”, showed that the level of wasting, stunting, and underweight in children under the age of three years was 5.5%, 38.7%, and 15.6% respectively.

5.6 Administrative Location

5.6.1 District and Town Administration

The District Administration oversees the Central Government administration in the district. The office is tasked with coordinating Central Government initiatives. It is headed by the Senior Assistant Council Secretary. The project area falls under Tutume Central which is located within the jurisdiction of the Tutume Sub District Administration, who report to the Central Administration headquarters in Serowe which is headed by a Council Secretary. However, Sowa Town by virtue of being a town is administered by the Sowa Town Council which is different from the District Council and independent and it is headed by a Town Clerk.

5.6.2 District and Town Council

The Central District Council within which the project area falls oversees provision of social infrastructure and amenities within the district. The District Council, which is politically headed by the Council Chairman and administratively by the Council Secretary, prepares and implements the District Development Plans. The Sowa Town Council, which is politically headed by the Mayor and administratively by the Town Clerk, prepares and implements the Town Plans. The Sowa Town Council and Tutume Sub District Council are delegated to execute Council responsibilities within the town and the sub-district, respectively.

5.6.3 Tribal Administration

Tribal Administration is tasked with the administration of justice under the customary law. The head of Tribal Administration in Central District is a *Kgosi* (Chief) (who is currently the acting paramount Kgosi, Kgosi of Bangwato Kgosi Serogola Seretse based in Serowe. He is the area’s representative at Ntlo Ya Dikgosi (House of Chiefs) which comprises of various other *Dikgosi* (Chiefs) from across other districts in Botswana. Other secondary villages within the district are led by a *Kgosi* (Table 60). Other villages are presided over by either Headmen of Records or Headmen of Arbitration. The Kgosi together with the headsmen exercises traditional authority after consultation with the tribe. The Kgosi arranges tribal ceremonies, assist in checking crime, promote the welfare of the tribe, convenes, and presides over *Kgotla* meetings.

Table 60: DiKgosi of the Project Area

Village	Kgosi
Sepako	Kgosi Ramaditse / Kgosi Nkaelang
Manxotae	Kgosi Mokgadi
Maposa	Kgosi Sibanani Maposa
Nata	Kgosi Kgaswa
Dukwi	Kgosi Mosweu
Mosetse	Kgosi Ntshwarelang
Kutamogoree	Kgosi Motsamai Kgosi

It is significant to note that in Botswana the law requires every Kgosi to carry out instructions given to him by the Minister of Local Government and Rural Development. Any Kgosi who fails to comply with any direction given to him by the Minister is liable to be suspended or deposed. The Minister is also authorized to make regulations for the better carrying out of the provisions of the Bogosi (Chieftainship Act), including general conditions of service and the procedure for taking disciplinary action. Provisions of the (Bogosi) Chieftainship Act, which give enormous authority to the minister, establish complete supremacy of the central government over the traditional leaders in Botswana.

5.6.4 Political Administration

The project villages fall under the Nata-Gweta constituency; the headquarters of the constituency is Sowa Town. Political leadership in Nata-Gweta is provided by a Member of Parliament (MP) assisted by various Councilors presiding over various village wards and representing them at the District Council. The MP for Nata-Gweta is Honourable Paulson Majaga. MPs have responsibilities to three main groups: their constituents, Parliament, and their political party. MP's duties in Parliament include participating in debates and voting on legislation and other matters. They may also be members of committees examining new laws or the work of government departments. MPs can help their constituents by advising on problems (particularly those that arise from the work of government departments), representing the concerns of their constituents in Parliament and acting as a figurehead for the local area.

5.6.5 Institutional Set Up

The institutional set up of planning in Botswana can be divided into three levels: Community Level, District Level and Central Government Level. The institutions at the community level, which are involved in the development process can be divided into two main categories: The Traditional Institutions – so called because of their pre-colonial origin – are the Bogosi (Chieftaincy), the kgotla and the wards. The kgotla represents the “institution” where common consensus can be arrived at and where development initiatives and participation can be encouraged. It is a traditional authority, Kgosi, Sub-(Kgosana), village headmen and ward heads are critical links between communities and government authorities. All villages have a Kgotla and the village Kgotla is led by the Kgosi who is responsible for calling the Kgotla meetings, trying cases under customary law, and is involved in village development. The modern institutions – so called because most of them were created after independence e.g. the Village Development Committee (VDC), Village Health Committee (VHC), Parents Teachers Association (PTA), and other village organisations such as, churches, burial societies, farmer's committees. All committees report to the Village Development Committee (VDC). The VDCs were established by a Presidential Directive of 1968 for the purpose of implementing development programmes in villages. It is responsible for all village development matters and coordinates all village institutions' activities. It is however responsible to the Kgotla on matters related to development.

5.7 Waste Management

5.7.1 Solid Waste Management

Solid waste or refuse management is administered by Environmental Health Department of Tutume Sub-District Council and Sowa Town Council, respectively. The Environmental Health Department usually engages private companies to collect solid waste in some villages on their behalf. Lately, collection of waste has been outsourced to the community through the use of donkey carts to transport waste to the disposal sites. Waste collected from government institutions and residential houses is disposed of at respective dumping sites. All the project villages have dumping sites. However, the dumping sites are not fenced, and as such there is illegal access by people and animals which pose a health concern. There is no segregation of waste or compaction that is practiced at these sites. The

Department of Environmental Health indicates existence of the problem of indiscriminate waste disposal and the department has embarked on annual clean-up campaigns through cleanest school and village competitions.

5.7.2 Other Types of Waste

During the implementation of the proposed sub-project, there are various types of waste that will be generated, which will be foreign to the project areas.

Waste Oils and Hydrocarbon Waste

The proposed project is likely to generate waste oils from off-loading trucks and other machinery. Used oil is very harmful to the environment and spilled oil tends to accumulate in the environment causing soil and ground/surface water pollution over time. Fuel spillages are anticipated from mobile fuel storage tanks and during the fuel filling process. Waste oil may be generated from faulty machinery, for instance, trucks and excavating machinery with oil leaks. Similarly, the use of heavy machinery is likely to release hydrocarbons into the atmosphere.

Damaged uPVC Pipes, Connectors and Tape Trench Marker

Waste from damaged uPVC pipes, connectors and tape trench marker are anticipated. If this kind of waste is not controlled, it could be a nuisance to the environment by compromising its aesthetic appeal. This could also be of danger if consumed by the abundant livestock in the area.

5.7.3 Waste Management

Though attempts have been made to manage solid waste in the area by constructing dumping sites in each village, solid waste is poorly managed in the project area. Many households do not have waste receptacles. The Local Authority does not have appropriate facilities to dispose domestic waste properly, except at the unfenced dumping sites. This could lead to environmental degradation resulting in breeding places for pests such as rodents and insects. Most of hazardous wastes are not managed except clinical waste, and this could result in environmental pollution in the area. There are no facilities for disposal of sewage in the project area except the Township of Sowa which has Wastewater Treatment Plant. This may lead to fouling of the environment. The challenge to the proposed sub-project will be collection and disposal of the liquid waste as it is likely to be costly.

5.8 Social Assessment of the Basarwa

5.8.1 History of San (Basarwa) in Botswana

The Basarwa (also known as San peoples) have lived in Southern Africa since prehistoric times. Archaeological evidence indicates that the San lived in small mobile groups with complex microlithic stone tool technology (Hitchcock et al., 2006). At one time, the San occupied an area stretching from the Congo-Zambezi watershed in central Africa south to the Cape. The San were relatively widely dispersed in the region. Today, San peoples (estimated population 90,000) reside in six countries. Most of the San are found in the Kalahari Desert region of Botswana (estimated population in Botswana, 55,000 persons; Namibia, 27,000; South Africa, 10,000; Angola, <5000); Zimbabwe, (1,200; and Zambia, numbers unknown).

Botswana is a culturally diverse country. Its Constitution initially recognized eight major tribes. However, several other ethnic groups have recently obtained such official recognition, Basarwa included. Although most of these groups claim to be “original” to Botswana and many of them live in marginal conditions and are considered vulnerable (which the government understands the term to mean), there is little doubt that the San (Basarwa) have been historically excluded for their distinct cultural characteristics, and that affirmative measures are necessary to ensure their inclusion and cultural survival in the country. Numerous studies suggest that the San are among the oldest peoples of Africa, and in Botswana, are found to be the first place to have originated some 200,000 years ago.¹⁴

Traditionally, the San were semi-nomadic. Their association with the land was based on complex intra-cultural negotiated systems and because they had no formally recognized land tenure system, they were often being seen as having no land of their own (and therefore no rights to land). Territory available to the San has shrunk over the last century through successive in-migrations of both colonial and other African tribal groups, as well as various government policies.

After independence in 1966, the land situation of the San further deteriorated and the Tribal Grazing Lands Policy (TGLP) a large-scale land reform and livestock development program adopted in 1975 virtually left no land “in reserve” for the San. Despite some attempts by the Bushmen Development Program (1974) and its successor, the Remote Area Development Program (1978) to retain a portion of the land the San used to have, the land reform process entailed loss of land tracts that had economic as well as cultural significance for the San. It also resulted in the removal of an estimated 28,000 - 31,000 people from the TGLP Ranch areas, and their subsequent relocation in government established settlements.

These settlements were part of the Government’s efforts to integrate the San into wider society and enhance their development through the adoption of agriculture and cattle-raising as livelihood options. However, while the settlements provide water, schools, and health posts, most Government projects have not fully succeeded in providing sustainable livelihood. As early as 1986, the Government took the decision that people in the reserve would be encouraged to move out of the reserve to enhance development opportunities.

5.8.2 History of Basarwa in Kutamogoree, Moseitse and Manxotae

Basarwa have lived in the Nata area, which includes Kutamogoree, Manxotae and Moseitse, for centuries in peace and harmony with nature until their contact with European trophy hunters in the

¹⁴ Indigenous People’s Planning Framework – Human Wildlife-Conflict Management (HWCM) in Northern Botswana Project (2016). See also Chan, E.K.F., Timmermann, A., Baldi, B.F. *et al.* Human origins in a Southern African palaeo-wetland and first migrations. *Nature* **575**, 185–189 (2019) doi:10.1038/s41586-019-1714-1.

early 1860s, and later the Bangwato. The latter group became Basarwa's self-declared landlords or masters. Initially, Basarwa never imagined Bangwato being their masters or landlords. They viewed them as sophisticated hunting partners. Gadibolae (1985:25) says that the 'formal' contacts between the two groups began in the 1860s, when Bangwato organised hunting expeditions into the Nata area, looking for the prized elephant tusks, ostrich feathers and kerosses. Many African communities had enthusiastically responded to the globalised ivory trade, spearheaded by the Griquas in Southern Africa. The Griquas had moved into what is today Botswana, from the Cape Colony, at the beginning of the 1800. They recklessly killed thousands of elephants, using guns, to harvest their tusks (ivory), which was in high demand in Asia and Europe (Tlou and Campbell, 1997: 173-176). Despite the reckless destruction of wildlife, the Griquas were later joined by some Tswana groups, especially the Barolong and Batlhaping, who became long-distance wagon traders.

Bangwato-Basarwa Relations in the Nata Area, 1860s Onwards: The Bangwato too dispatched hunting expeditions, which went as far as the Boteti and Nata areas, to kill elephants for their ivory. They had guns and political power to subdue many weaker groups, and the Basarwa of Nata and Boteti became casualties. It is, however, worth noting that at first the Basarwa were not coerced to join the Bangwato hunting expeditions. They willingly joined since they lived by hunting and gathering of wild fruits. The fact that guns made hunting easier obviously attracted Basarwa, who had relied primarily on rudimentary methods of hunting. Gadibolae (1985:25) argues that over time, Bangwato gave Basarwa hunting guns and dogs to hunt for them, especially to supply ostrich feathers, tusks and kerosses, which 'fetched high prices overseas'. Basarwa participated in the hunting expeditions as a way of having easier access to game meat, and not necessarily the lucrative ivory trade, which they had no clue about. However, the relations between Basarwa and Bangwato in the Nata area changed from happiness to sorrow when the lucrative ivory trade declined, largely due to the near depletion of elephants in the area. When this happened, the western world and international ivory buyers turned around and blamed Africans for less regard for wildlife (Hinz, 2003).

Bangwato, realising that the international ivory trade, which had provided them with capital, political and economic prestige, was declining returned to cattle farming, which they had, temporarily, 'neglected'. Thus, Khama III 'ordered his headmen to allow their cattle to be herded by the Basarwa, so that they (Basarwa) could have the benefit of the milk' (Gadibolae, 1985:25). This was the beginning of the unequal relationship between the two groups. Basarwa were forced to become serfs (malata) of the Bangwato, a dehumanising practice. This was, however, largely ignored by the colonial government. Bangwato expanded and intensified cattle farming, and, thus, 'conscripted' Basarwa men and boys to herd their cattle. The introduction of western education also meant that the Bangwato boys, whose main job had been traditionally herding of cattle, had to go to school. Their replacement was sought in the form of Basarwa boys and men (Gadibolae, 1985: 25). It was easier to subdue Basarwa because Bangwato were politically and economically powerful. Bangwato used headmen to control faraway places, and Basarwa were distributed to these headmen. Thus, 'In the Nata, all Basarwa belong to one of the Bangwato wards such as Ditharapa, Maaloso, Sekao and Basimane' (Gadibolae, 1985:25).

Basarwa in Moseitse: The area, Moseitse, was and is also known as 'Debeetshaa', a Sesarwa word meaning salty water. Debeetshaa is a tributary to the Moseitse river. Despite the contestations about the name and naming of Moseitse, there is no doubt, even among all the groups found there, that Basarwa are the first inhabitants of the area. Mengwe (2010:121) says that the prominent Basarwa group in the area was led by Xuxuwe Kolobe. This group was befriended by the Bangwato and Bakalanga, who came to the area for different reasons, and at different times. Inter-marriages between different groups in the area produced a heterogeneous community. The exploration of minerals by the Roan Selection Trust (RST), between 1962 and 1982, attracted migrants from other parts of Botswana, mainly the north-east. A Witwatersrand Native Labour Association (WENELA) camp was erected in

what is today Moseitse, and it housed these migrant workers. Due to mining, a permanent settlement was established along the banks of Moseitse river, the village of Moseitse today. It was officially declared a village in 1971. Many groups of people, who had lived in scattered cattle-posts around the area, moved to Moseitse, thus 'producing a heterogenous community dominated by Basarwa' (Mengwe, 2010:121). Even if so, the non Basarwa groups in the area looked down upon them, and exploit them, especially by using them as cheap and sometimes free labour.

Basarwa in Matsitama: Matsitama is not explicitly mentioned as a study area, yet it is dominated by Basarwa. Originally, Matsitama was called Dauginae, a Sesarwa word meaning 'a road to the river'. Basarwa cattle herders used the road, passing through the area, to water cattle at the river. Matsitama was known for its valuable copper, which was verified by geologist Rolf Kreimeyer (Rannoba, 2019). It was also regarded as the cattle posts of Bangwato. By the 1930s, Basarwa lived as serfs in the Bangwato owned cattle posts in the Nata area (Gadibolae, 1985). Bangwato found in the Matsitama area today came during the reign of Khama III. Moseitse, Jamini, Matakane, Mokubilo, Lekobeng, and Lepashe were all used by Bangwato as cattle posts (Rannoba, 20219). In 1962, a copper mine, run by the RST, was opened in Matsitama, and a settlement started. Before then, there were cattle posts. The Cire Cire (a Basarwa group) used Matsitama as a refuge after the mine opened. They were running away from servitude and ill-treatment by their masters, Bangwato and Bakalanga. The RST opened a school, mainly for the workers of the mine. Over time, its officials allowed the Basarwa children to also attend. However, when the company closed shop in 1966, the issue of who will take over the school arose. The mine consulted the people. It told them that they should consider taking over or the mine would have to destroy the structures. Basarwa contacted Bangwato, the contested 'owners of the land', about their (Basarwa's) desire to take over the school. Bangwato granted them permission. The Basarwa communities had no choice, but to ensure that Matsitama became a village. Thus, unlike the other groups, who had options to go back to their original villages, they (Basarwa) had left the cattle posts, running away from their oppressive masters. Matsitama became a haven and place of peace and tranquility, away from the dehumanising environment (Rannoba, 2019). In 1981, Matsitama was officially declared a village by the government. It was and still it is inhabited mainly by Basarwa, Bangwato and Bakalanga.

5.10 Social Assessment of Vulnerable Communities of the Sub-Project as per OP4.10

The Basarwa communities in Kutamogoree, Manxotae and Moseitse were screened against the criteria of OP 4.10. They were found to meet the characteristics in varying degrees as a distinct social and cultural group, despite changes in their traditional livelihoods and cultural practices as a result dislocation from their lands and cumulative impacts of various policies on them:

i. Self-Identification

They self-identify as members of a distinct indigenous cultural group and are recognized as such by others in national, regional, and international contexts. This is because they still identify themselves as Basarwa and have not forgotten their ancestral history.¹⁵

¹⁵ According to some national organizations representing Basarwa in Botswana, they find the term Basarwa derogatory as it is an imposed term and would prefer the term "Bakhwe" be used. However, the two communities that were consulted for this project preferred the term Basarwa and will be referred to as such here. In addition, "San" is a generic term and the distinct linguistic groups among the San designate themselves by their own name, as for instance, Khwe, Nharo, †Khomani, etc. However, as noted above, some communities still prefer to use the term Basarwa. The project will use the term preferred by the community. See Albert Barume, *Land Rights of Indigenous Peoples of Africa*. (Copenhagen: IWGIA, 2014), p. 12.

ii. Collective Attachment to Ancestral Lands or Geographically Distinct Habitats

The Basarwa in the sub-project area have formed a collective attachment to the land they currently occupy, even though historically the project area would not be considered their ancestral territories. Since the early 1900s, many Basarwa left their lands because they were transformed into large cattle farms and national parks such as the Central Kalahari Game Reserve (1961) and the Kalahari Gemsbok National Park (1931)¹⁶. Despite ancestral land loss, the Basarwa in these three settlements formed a collective attachment to land they currently occupy.

iii. Distinct Customary Cultural, Economic, Social, or Political Institutions

They still practice hunting at a small scale as they must apply for a permit to hunt for example guinea fowls and other game, and they still gather wild fruits and tubers for their consumption and selling any surplus left. They still practice their ancestral dance of 'tsutsube'. They still teach their children this dance and even take them to the western side of the country to learn their ancestral dances. In addition, they still practice 'botsetsi' to commemorate the transition of a girl to womanhood at first menstruation, as well as rites of passage for boys who are maturing into manhood. In addition, there are traditional healers in both settlements who provide healing through prayers to the gods and herbs or traditional medicine, and some practice their traditional religions in addition to Christianity.

iv. Distinct Language or Dialect

The Basarwa speak their distinct dialect, Sesarwa, a click-based language that differs from other languages in the country, even though some of the young generation cannot speak the language.

The presence of the Basarwa in the sub-project area calls for the development of a Vulnerable Communities Plan (VCP). The preparation of the VCP takes into consideration the findings of the social assessment of the communities in the project areas. Basarwa people, who in most of the development policies and legislation of Botswana are referred to commonly as the Remote Area Dwellers, are the group of people who speak different click languages and they originally survived on hunting and gathering. A VCP will be prepared as an additional plan along with the ESMP for the Sowa Water Supply Scheme. Its purpose is to ensure the application of the World Bank's Indigenous People's Policy OP 4.10 in the planning and implementation of the Sowa Water Supply Scheme.

16 IPPF for the World Bank funded project, Human-Wildlife Conflict Management in Northern Botswana (2016).

6. ARCHAEOLOGY

6.1 Introduction

A review of the archaeology of the project area largely focuses on an overview of research into the prehistory of the Makgadikgadi area. A fair amount of archaeological research has been undertaken in the project area. The geomorphological history of Palaeo-lake Makgadikgadi, now the Makgadikgadi Pans, has been a focus of study by both geomorphologists and archaeologists since the 1940s. Wayland, who was the Director of the Geological Survey from 1943-1952, collected over 6000 stone tools as 'zone fossils' to date geological strata and geomorphological features. The data further provided climatic oscillations in the past, especially 'pluvials'. He did much to dispel the notion that the Kalahari was a marginal environment into which the Bushmen had been pushed by Bantu farmers. His collection, from 159 sites, was analyzed by Cran Cooke (1970) in his preliminary survey of the Stone Age of Botswana. This included an Acheulian site at Lake Xau, Middle Stone Age sites on the Nata and Boteti Rivers, Lake Xau, Letlhakane and at Bushman Pits, and Late Stone Age near Gweta.

Ebert and Hitchcock followed up on this in the late 1970s by more specifically targeting strandlines of ancient Lake Makgadikgadi, especially on the east and south shores, using stone tool assemblages from 38 sites to attempt to establish a chronology of the Palaeo-lake and an initial understanding of the prehistoric climatic conditions required to maintain certain lake levels. Work, initially by Netterberg in the late 1960s and taken up by John Cooke, Shaw, and Thomas in the 1980s obtained Carbon-14 dates from calcrete directly associated with ancient strand lines, which in turn clarified the archaeological sequence. This culminated in Thomas and Shaw's (1991) comprehensive book *The Kalahari Environment*, bringing together years of research by geomorphologists, paleoclimatologists and archaeologists and presenting a fascinating history of environmental changes from vast inland lakes and major perennial rivers to the pans, dry fossil riverbeds and semi-desert of today. Included in this work is a chapter on "The Kalahari in the archaeological record", and there is an appendix with 98 radiocarbon dates from archaeological sites. These are, however, from the wider Kalahari, not only the Makgadikgadi Pans area.

The changing landscape of rivers, lakes and pans has, of course, had a profound effect on the distribution of human populations in the landscape and their adaptation to the environments at the time. The study of human adaptation to the Makgadikgadi continues currently with a large research project under David Thomas and Sallie Burrough of Oxford University, entitled "Paleolithic mega-lakes and early human occupation of the Kalahari" (Thomas and Burrough, 2009). The team includes archaeologist Larry Robbins. Jim Ebert and Bob Hitchcock have studied 100 sites in the Makgadikgadi, starting 2010. This current project was able to be more detailed, through the dating of sediments by optically stimulated luminescence (OSL) and with the use of a DGPS. Initial research has focused on the northern Ntwetwe Pan and has established a very rich scatter, mostly of Middle Stone Age tools, on the pan floor, possibly from seasonal hunting following migrating herds. Important to note is also the presence of fossil bones in the north Ntwetwe area (A. Campbell, *pers. comm.*).

The problem with previous surveys was that most took place before GPS was available to determine the exact locations of sites, and hence, with a few exceptions, the sites have not been registered with the DNMM. Another problem was the absence of dateable materials on open sites, and comparative dating could only give an approximate time period by comparing artifact types with the known chronology from cave sites in Zimbabwe.

Modern humans are believed to have evolved in southern Africa c. 250,000 years ago and their tool kit also changed around that time to what we call Middle Stone Age. The Ntwetwe area may have played a role in this important period in human history. OSL dates of barchan dunes in this area have also established a surprisingly recent (c. 2000 BP) period of extremely dry conditions. It is hoped that the OSL chronology of geomorphological features can establish a more detailed climatological

sequence, especially over the last millennia to understand human occupation of the wider region, especially the introduction of livestock and the arrival of early farmers, and the rise and fall of chiefdoms and states.

In the 1980s surveys were also carried out by Campbell and Denbow especially, both for research such as along the mouth of the Boteti River, but importantly also the first Archaeological Impact Assessments (AIA). Denbow (1984) for BP Soda Ash in Sowa Spit, as well as the lower Semowane and Moseitse rivers, discovered Late Stone Age (LSA) sites along the East Sowa shore and inland along the rivers, an important cluster of LSA sites with Bambata pottery at the previous mouth of the Semowane river, and a Zimbabwe Tradition elite site, known as Toranju, and a game trap, called Tshwane near the Moseitse river.

Bambata is the first pottery found in Botswana, c. 0-400 AD; it is found in small quantities on LSA sites and is associated with the first domestic stock. This period is important for studying contact between hunter-gatherers and farmers and changes in adaptation to the Makgadikgadi environment consequently. The origins of Bambata are hotly debated and the lifestyle of these early "herders" yet little understood, hence such sites are very important for research. Bambata sites were also found by Campbell (1987) during his AIA survey of the Boteti River between Sukwane and Moremaoto for a proposed dam at Sukwane. He also discovered several Khoe sites in this area, as well as lower down the Boteti River.

Khoe-speakers were ancestors of the Badeti, still found living along that river. They were the first true pastoralists in southern Africa, related to the Nama in Namibia and Khoikhoi/Hottentot in South Africa. Linguistically it is believed that they had their homeland in northern Botswana, possibly along the Boteti, and migrated from there to the west and south. Archaeological evidence is still too limited to determine if this is correct. Their characteristic pointed-based pottery with pierced lugs identifies sites along the Boteti as Khoe, but none have yet been dated satisfactorily nor are any properly excavated. It is expected that Khoe sites will date between 750 and 1800 AD (Reid *et al.* 1998). These sites are also very important for research. The relationship between Bambata sites and early Khoe is also not understood.

Other AIAs have been undertaken along the Nata-Maun Road and powerline, the road and powerline to Sowa, the road from Rakops to Motopi and for the mines at Orapa, Damtshaa and Letlhakane and associated infrastructure (see Refs.). In 1994-5 Mike Main conducted a systematic archaeological survey along the Mosu escarpment, which forms the south side of Sowa Pan, as part of a series of outward-bound style management courses. The 51 sites which he and his teams recorded show an important occupation of this area during the Zhizo to Leopard's Kopje periods, dates available are between 900 and 1400, especially 900-1000 AD, a period which is generally believed to have been wetter than today. These cultures are found also in northeast Botswana and western Zimbabwe.

The Leopard's Kopje probably developed out of Zhizo in northeast Botswana, western Zimbabwe and the Sowa Pan area, and the sites on the Mosu Escarpment, having pottery of both cultures found together between 900 and 1000 AD, are likely transitional sites. This is a very controversial conclusion, as other archaeologists insist that these are two separate peoples, with the Leopard's Kopje people arriving c. 1000 AD as new immigrants. These people possessed large cattle herds and their settlements are generally on hills or promontories sticking out of the escarpment, and have some walling associated with them. The main site, Kayishe, has received some excavation by Reid of the University of Botswana (Reid and Segobye 2000b), and Denbow is expected to conduct further excavations there in 2010. A related site is Thitaba on the east edge of Ntwetwe Pan, between Ntwetwe and Sowa Pan. This site is surrounded by a wall and has a very large midden.

Seventeen kilometers southeast of Thitaba, on a scenic peninsula sticking out into Sowa Pan is the well-known Lekhubu Ruin. This is a walled enclosure with unusual loopholes and drains through the

wall, as well as many stone features. The function, cultural affiliation and date of these remain a mystery. It is likely, however, that these too are of the Leopard's Kopje period, as only pottery from that time has been found on Lekhubu and Thitaba. There are two other walled enclosures, but with coursed walling in the Zimbabwe Tradition style: Khama Ruin on the Mosu escarpment on the SW corner of Sowa Pan and Tlapana Ruin on the SE corner of Sowa Pan. These are likely of the early Zimbabwe period, 13th-14th century and represent a connection between the Leopard's Kopje culture area and the Zimbabwe State.

Excavations at Toranju Ruin on the east side of Sowa Pan by Denbow have shown that this site was occupied during the 13th to early 15th century. These three Zimbabwe Tradition elite sites are, therefore, likely contemporary. Such sites have been shown elsewhere to be residences of chiefs. The importance of the Leopard's Kopje and Zimbabwe periods lies in the exploitation of Makgadikgadi resources, which were likely grazing for large herds of cattle, hunting of abundant game for meat and hides, and harvesting and trade of salt. Large copper deposits to the east were also mined during this time (Van Waarden in progress). The government has recognized the importance of these sites and has declared Kayishe, Thitaba, Lekhubu and Khama Ruin National Monuments, whereas Toranju Ruin is fenced and signposted.

There seems not to be a significant presence of people around the Makgadikgadi during the 16th to the 18th centuries, at least judging by the known sites. In the 19th century the Ngwato, a Tswana tribe, retreated to Mosu during the invasions of the Matebele, while many Kalanga fled from the northeast to the Boteti, where they found Badeti, the Khoe group mentioned previously. Around Sowa Pan and the Nata, Semowane and Moseitse Rivers lived Sua-Khwe, also Khoe-speakers, who were especially adapted to life along the rivers and are known as "River Bushmen". With them were Kalanga farmers, descendants of the citizens of the state Butua, which was the dominant power in northeast Botswana and western Zimbabwe from 1425-1830 and the successor to the Zimbabwe state. These peoples were found around the Makgadikgadi and its associated rivers by explorers such as Livingstone, Baines, Green and Chapman and described in their diaries. Sua-Khwe have also been the subject of ethno-archaeological research and used as comparison with prehistoric riverine hunter-gatherers of LSA and Bambata sites and feature in the debates around hunter-gatherer and farmer contact through time and the evolution from a hunter-gatherer existence to farming in general.

Although a fair amount of research has, therefore, been undertaken and is being undertaken in the Makgadikgadi Pans area, the areal extent of the surveys is but a small percentage of this vast area and many more sites remain to be discovered. That said, it is likely that most of the important sites are known, because of the near complete surveys of the Mosu escarpment and the Boteti river. None of the sites has been sufficiently studied, however.

6.2 Importance of Archaeological and Heritage Sites

Heritage resources are non-renewable and are susceptible to alteration, damage, and destruction by construction and development activities. The value of heritage resources cannot be measured in terms of individual artifacts or biological specimens, rather the value of these resources lies in the integrated information which is derived from the relationship of the individual artifacts and fossil specimens, associated features, spatial relationships (distribution), and contextual situations.

Archaeological resources are important because they enhance economic development, especially tourism. They also act as 'spiritual homes' for various local communities. Most nationals use them as a form of identity, for example, Zimbabwe as a country is named Great Zimbabwe. This is an archaeological site. It is imperative that environmental protection recognizes the need to protect cultural resources.

6.3 Methodology

The data base for this section is derived from a list of the known archaeological sites and other monuments that are registered with the Department of National Museum and Monuments (DNMM). This is based on the Sites Register at the DNMM, which consists of a form for each site, 1:50,000 maps on which the sites are indicated and a computer file with basic information. For purposes of this archaeological and heritage impact study, site surveys were made in the project area to assess how the proposed developments will impact on cultural heritage resources. As information in the Sites Register was incomplete, details were added from the literature (refs. attached). Unfortunately, there remain many blanks in the list. To understand the nature of the sites in the project area, it is necessary first to provide some background as to the legal protection of the sites and a summary of the prehistory of the area as well as the general history of *merafhe* in the area. Intangible sites are also briefly discussed.

Beyond desktop of the DNMM data base, general literature review was undertaken to identify the occurrence of archaeological or heritage materials within the critical path of the Sowa Water Scheme. A Samsung ST66, 16 megapixels was used to take pictures of and a Global Positioning System (GPS) of model (Garmin E-Trek Legend) was used for mapping purposes.

In addition, oral interviews and public consultation of local communities were undertaken. Local people were interviewed to establish if there are any sites of archaeological and historical value that they are aware of in and around the proposed site for development. Interviews were also aimed to solicit information about religious sites, taking into consideration the nature of local communities to worship at naturally occurring land marks. Also interviews sought to obtain local community's views and perceptions of the potential socio-cultural impact of the proposed water scheme and the perceived and/or expected benefits.

The DNMM guidelines for assessing site significance were used in this study. The guidelines are intended to assist in mitigation implementation by the project proponent based on archaeology and heritage impact recommendations. The following site significance ranking system was adopted:

1. Identify sites to preserve at all costs;
2. Preserve if possible, otherwise extensive salvage work be carried out;
3. Test excavations to determine whether further work is necessary;
4. Systematic preventative sampling sufficient; and
5. No further archaeological work required.

A key component of our cultural heritage impact study was on a desktop study and description of the topographic features including soils and vegetation. It is argued that the proposed palaeo-landscapes could have been scenic and attractive to prehistoric and historic peoples in the same manner they attract contemporary societies. This information aids in anticipated finds and impacts within the critical path of the water scheme.

6.4 Conclusion and Recommendations

Literature review shows that there is potential to uncover sensitive areas/sites with cultural significance in the project area. These must be avoided and/or protected. The Makgadikgadi Pans area is extremely interesting for its geomorphological history and associated climate changes and the archaeology adds the human populations in this changing landscape. The archaeological sites chart the cultural evolution of mankind from early hominid hunters/scavengers to the first modern humans, hunters possibly following migrating herds, the first introduction of livestock and pottery into

southern Africa, arrival of Bantu farming communities, specialized riverine adaptations by Khoe groups, to chiefdoms of pastoralists living around the Sowa Pan especially in defensive locations on the escarpment edge in strategically- walled settlements, to the elite sites of the earliest Zimbabwe state, and refugee communities during the turbulent 19th century, in part documented in the diaries of early European explorers.

Since subsurface materials may be uncovered in the project area during construction, Archaeological Watching Brief and Monitoring Program should be implemented during all stages of the project that involve the disturbance of the subsurface.

7. ANALYSIS OF ALTERNATIVES

7.1 Assessment of Project Alternatives

The assessment of alternatives examines the feasible alternatives of a proposed project from different points of view: technical, financial, regulatory, jurisdictional, environmental, and social. Through this examination, the assessment of alternatives promotes better decision-making by identifying the most viable and financially feasible alternative. This approach minimizes adverse impacts and risks for communities and the environment – ultimately making a better, stronger and more sustainable project.

7.2 The Project Option Alternative

Implementation of the proposed sub-project would result in improved water supply in terms of both quality and quantity for the current and future needs of the project villages. The extraction of groundwater will increase water supply and hence add value to the livelihoods and economy of residents since adequate water supply can support government programmes and promote investment activities. However, developing mitigation measures to minimise and avoid the potential negative impacts would lessen the effects of the project on the environment and the general social well-being of the communities.

7.3 The “No Project” Option

The ‘No Project’ Option (zero option) alternative will be to maintain the existing *status quo*. Without the proposed project (Sowa Water Supply Scheme), the communities would continue to experience inadequate and saline water supply. With raising water demand exacerbated by climate change events, the affected communities would continue to be exposed to increased environmental and social risks as well as associated health and safety issues. Therefore, it is evident that the ‘no project’ option would not be beneficial to the overall economic growth and welfare of the communities and environment.

Table 61: Evaluation of Project Alternatives

Environmental Feature	Project Option Alternative			‘No Project’ Option Alternative		
	Rank	Wt.	Score	Rank	Wt.	Score
Air quality	2	3	6	1	3	3
Aesthetics	2	3	6	1	3	3
Biological resources	3	4	12	1	4	4
Socio economy	3	3	9	1	3	3
Cultural resources	2	3	3	1	3	3
Hydrology and water quality	2	4	8	1	4	4
Noise	2	3	6	1	3	3
Total Score			50			23

Air Quality

Air quality impacts are primarily associated with vehicle emissions. Short-term air quality impacts are associated with construction activities (e.g., earthmoving vehicles) in comparison to the long-term impacts of visitor traffic and stationary source emissions. No new short-term construction or long-

term operational air quality emissions would occur with implementation of the 'no project' alternative. Under the 'no project' alternative, the project site would remain in its existing condition and would not experience an increase in short-term or long-term air quality emissions. Therefore, this alternative would have fewer impacts on air quality in relation to the proposed project.

Aesthetics

No changes to the aesthetic quality or visual character of the project site would occur under the no project alternative. Under this alternative, no new structures would be built at the project sites. This would avoid the removal of vegetation, in addition to preventing moderate changes in topography within the project site from grading activities. In addition, under this alternative, no new sources of light and glare would be introduced at the project site. Although development of the project site is not expected to substantially degrade the existing visual quality or character of the project site or surrounding areas; and although these impacts were found to be less than significant, this alternative would have fewer impacts on aesthetics in comparison to the proposed project.

Socio economics

The increase in jobs, wages and salaries, and output in the regional economy, are part of the project impacts. Construction of pump stations, storage reservoirs pipelines and elevated tanks would require employment of engineers, construction supervisors, and general construction labourers. These activities would result in economic effects, or increases in jobs, wages and salaries, and economic output in the regional economy.

Biological Resources

The project site would remain in its current condition under the no project alternative. Biological Resources impacts resulting from implementation of the proposed project can be mitigated to less than significant. However, because the no project alternative would result in no impact to biological resources, this alternative would have fewer impacts on biological resources compared to the proposed project.

Cultural Resources

The project site would remain in its current condition; no ground-disturbing activities would occur under the no project alternative. As such, there would be a significant reduction in the potential for the disturbance or destruction of archaeological or paleontological resources. Even with implementation of mitigation measures under the no project alternative, as these historic resources cannot be recreated, this would be considered a significant and unavoidable impact under the 'no project' alternative and would result in no change in comparison to the proposed project.

Hydrology and Water Quality

Under the 'no project' alternative, the project site would remain undeveloped. In the short term, the no project alternative would not require earthmoving activities that would result in increased erosion and sedimentation. In the long-term, the 'no project' alternative would not result in an increase in impervious surfaces and storm water runoff (i.e., rate, volume, pollutants, etc.) within the project site, nor a change to net demand on the project site. The hydrology and water quality impacts of the proposed project would be mitigated to a less than significant level. However, because the 'no project' alternative would not result in alterations to the drainage and water quality characteristics of the

project site, this alternative would have fewer impacts to hydrology and water quality in comparison to the proposed project.

Noise

Development creates short-term noise impacts from the operation of construction equipment and long-term noise impacts from increased vehicle traffic. Under the 'no project' alternative, the project site would remain in its current condition. No noise from short-term construction or from long-term operational activities would occur; therefore, no noise impacts would result from this alternative.

Adopting the 'no project' alternative will eliminate potential negative social or environmental impacts associated with the implementation of the proposed project. The 'no project' alternative will however affect the mandate of WUC as a water supply authority of developing a reliable water supply scheme for potable water supply that will sustain the water requirements for the project villages in the short and long terms. WUC's mandate is to ensure that all the residents of the country have access to potable water at all times in a most cost-effective manner. Currently, it is practically impossible to meet the ever-increasing water demand in the villages from the current operating scheme, owing to rapid population increase within the project villages, as well as water losses from pipe breakages and leakages thereof. The economic and social benefit of the proposed project is comparatively higher than maintaining the *status quo* and not realizing the project. Therefore, the 'no project' alternative is not a viable option.

The 'No Project' Alternative fails to achieve any of the project objectives, which are directed at improving water supply reliability, offsetting surface water demand, minimizing environmental impacts, achieving financial sustainability, and protecting human health; therefore, implementation of the water project is required.

7.4 Location Alternatives

7.4.1 Tank Sites

Location alternatives were not considered for most of the project village's tank sites. Through public consensus, it was agreed on meetings held at the project villages from 11th to 14th October 2021 to continue with the existing sites and avoid disturbing new sites for new construction activities. However, the engineering design will determine where to place the tank based on the maximum coverage or gravity.

7.4.2 Pipeline Routes

In the same vein, majority of the proposed pipelines route that would connect Sowa Water Supply Scheme project villages have been agreed to be confined to the existing road servitudes to avoid disturbing new areas, hence preserving the environment. Also, this would significantly reduce the chances of unearthing archaeological material in the sub-project areas although the sub-project would still be subject to archaeological monitoring in case of chance discoveries/finds.

Alternatively, placing the pipeline outside the existing road network would require that a new route be created for the pipeline routes. This would result in high chances and risks of disturbing people's property and any other structures outside the road reserve.

Another alternative considered for the pipeline routes was the use of surface installations (galvanised steel pipes) along the existing road or any new route. The alternative would ensure the least disturbance of the environment, but it comes with these potential downsides:

- It is not cost effective.
- The pipelines would be aesthetically unappealing especially for an area of high tourism importance.
- The pipelines would be prone to damage and vandalism by wildlife or people.

Considering the alternative of underground installation for pipes routes would adversely impact the environment causing loss of vegetation, destruction of habitats (especially for burrowing animals), and disturbance of the sub-terrain structure. Using the existing road routes would ensure the impacts are limited, localized and minimal. Other benefits are:

- the grounds are easily stabilized after compaction,
- aesthetic appeal of the environment, and
- minimal chance of vandalism and the associated maintenance costs.

Considering all, the preferred option is to install the pipe underground within the existing road servitude.

Demand for Workers' Accommodation

The proposed sub-project will require several teams to undertake various tasks (construction of pump stations, storage reservoirs, pipelines and installation of elevated water tanks in several villages) therefore, the contractors' crew would need accommodation throughout the implementation of these activities.

An on-site worker accommodation camp alternative with a capacity of up to 50 persons was evaluated against off-site accommodations (renting accommodation along the project area).

An on-site worker accommodation camp was included in the detailed environmental assessment for the Project. The location for the on-site worker accommodation camp is within the project site and did not require additional baseline data collection. The need to consider an onsite worker accommodation camp as an alternative method of carrying out the project was determined based on detailed planning, consultation, and baseline studies. Detailed planning for the project clarified the total anticipated workforce, length of the commute and duration of the project. Consultation activities, including engagement with the communities confirmed that employment is important and that many community members live two or more hours from the sites making a daily commute from those communities impossible. The conclusion from the detailed planning, consultation and baseline studies was that an on-site worker accommodation camp would be required to ensure the Project remained feasible.

The evaluation of the alternatives is as follows:

iii. On-site Workers' Accommodation (With A Labourer's Camp)

Advantages

- Improved local economy due to increased business transaction from workers' influx.
- Inculcation of new ideas for community economic and social growth.
- Avoidance of transporting workers over long distances daily with its environmental, health and safety risks – noise, dust pollution, increased GHG emission and exposure to potential risk of dust inhalation, traffic accidents and risks of other accidents.

- Workers will be more accessible, energetic and focused on work.

Disadvantages

- Potential increase in social problems and community relations/contacts (such as sexual relations with community members, spread of sexual communicable diseases or other diseases, potential for increase in pregnancies, impacts on community relations, potential for conflict with community members due to disruption to social norms and relations).
- Does not promote the renting of empty houses available in the project area.
- Potential social conflicts between workers and host communities, such as fighting, competing for social services such as health, natural resources.
- Possible gender-based violence (GBV) and sexual exploitation and abuses (including of minors).
- Possible increase in alcohol and drug use.
- Noise generation and community disruption (shouting, playing of loud music etc.).
- Will require strict management and behavioural change of the workers to suit the norms of the beneficiary communities.
- High cost for decommissioning.

iv. **Off-site Accommodation (Renting Community Accommodation)**

Advantages

- Accommodation may be more comfortable for the workers, for instance, some people prefer to rent in the private market and maintain a sense of normality for their family.
- Closer to nearby amenities.
- Renting accommodation will make project benefits tangible to the community, e.g., rental money from the contractor.
- There is promotion of the use of existing infrastructure and available land other than the need to put in new infrastructure which might be subject to approvals from different authorities, hence delaying the project.
- Cost-effective as it utilizes the available land and infrastructure.

Disadvantages for Renting Community Accommodation

- Workers may arrive at work less energetic and less focused due to distances travelled (which takes time), which could result in occupational injuries.
- Potential social conflicts between the construction crew and the community due to proximity to each other.
- Potential conflict between the landlords and the tenants, for instance, rental money not paid on time, or as a result of poor house-keeping.

The preferred alternative (on-site worker camps) is widely used at remote sites and experience in the project area has shown that it is technically possible to provide the living and leisure facilities for a large workforce at a single site. The ability of regulated camps to limit access to drugs and alcohol (which can cause safety issues at the workplace) is also an advantage. However, camps are expensive to build and run (contract options are available) and they isolate local communities from the wider economic benefits of the industry. Their environmental footprint is outside of established communities' water, sewage, and safety services resources and as such they present a significant drain on the resources of the local area. Camps are essentially temporary structures ideal for short periods

of intense construction activity (in this case 12 months) but are not suited for long term (30 years or so) habitation without significant repair/overhaul.

Selection criteria for the camps (Contractors, Engineers, and Labours etc.) are primarily based on the following:

- Nearness to the worksites – the sites be as near as possible to the construction work areas such that access and approach to the construction sites is easy and within the walking distance.
- Camp location does not interfere with the construction works and maintain safety of the individuals living at the camps.
- Camp location should be at a distance from the local community residential areas.
- establishment of camps minimizes the loss of the standing forest vegetation and does not involve substantial landscape change; and
- Camps location lies in a stable area free from landslide risks and flood risks.

The worker accommodation camps are applicable to the proposed sub-project because some project works will be concentrated away from the villages (storage reservoirs and pipelines) while some will be within the project villages (pump stations, pipelines, and elevated tanks). Due to the remoteness of the beneficiary communities, it is recommended to establish two (2) main worker accommodation camps at the following proposed sites:

Camp 1. Labour Camp and Contractor's camp outside Dukwi village, near the Dukwi Waterworks that will cater for all the works from the boreholes, feeder pipelines, collector pipeline, proposed water storage reservoir to works within the Dukwi Village. Camp 1 should also cater for works halfway on the proposed pipeline, i.e., works from Kutamogoree, Moseitse, Dukwi and Sowa.

Camp 2. Another proposed contractor's camp to be established in Nata village that should cater for the pipeline from Sowa junction to Nata elevated tank and booster station, pipeline from Nata to Maposa to Manxotae and Sepako villages. There is availability of rented accommodation in Nata, therefore renting accommodation for workers will be a viable option based on advantages discussed above.

This recommendation assumes that there will be strict implementation of mitigation measures to prevent or minimize anticipated adverse social and environmental impacts. Some of these potential adverse impacts include SEA, SH, increases in sexually transmitted and infectious diseases including COVID-19, criminal activities (theft and affray, alcohol abuse and illicit drugs use, social conflict and ills, etc.). The contractor should avoid setting up labour camps within project villages to minimize the impacts of labour influx as outlined above, workers should commute from their homes if works are near the villages. All requisite land transfer/land use documentation will be acquired prior to the start of civil works. The following facilities and works will be carried out during camp establishment and will also be detailed in the ESIA:

- Site establishment
- Water supply and electricity power (solar) connections
- Ablution facilities (use of conservancy tanks)
- Workshops and storage sheds
- Plant, tools and equipment
- First aid equipment
- Requisite Personal Protective Equipment (PPE) (safety clothing, shoes, dust masks, boots etc.)



Figure 26: shows a typical layout for a camp site.

8. ESIA STUDY METHODOLOGY

8.1 Introduction

The ESIA study requires various methods to cover various facets of the environment but primarily if World Bank finances the sub-project it goes through a screening process. This chapter therefore highlights the screening process and other various methods required to complete the study successfully and to meet the requirements of WUC and the World Bank.

8.1.1 Screening by World Bank

According to the World Bank's environmental screening process, BEWSEP is classified as a "Category A" project thus the proposed Sowa Water Supply Scheme Sub-Project has been assessed as such. Projects of this type would have significant adverse environmental impacts that are sensitive, diverse, or unprecedented. The construction of the water transmission pipelines will affect broader areas especially since the project area has some wildlife species due to its proximity to wildlife management areas and the Makgadikgadi and Nxai Pan National Park.

8.1.2 Site Visits

A site handing over visit to the proposed project area was undertaken by the environmental and social consultants with representatives from PIU. Three additional site visits were undertaken by the environmental and social consultants. The purpose of the visits was to assess the existing biophysical and socio-economic environment of the project site and its surroundings. As well as to consult the community, the Village Development Committee (VDC) and the leadership of the village and other relevant key stakeholders.

8.1.3 Desktop Studies

The data in the environmental baseline comprised secondary data collected through review of literature and primary data which was collected through field site visit and transect walks on the project area. The sources of secondary data included but are not limited to: technical reports (Preliminary Design Report for the Sowa Water Supply Scheme); feasibility study reports; ecological and socio-economic profiles for Central Tutume District; government institutions; and other related reports and documents. The data collection and review were conducted to:

- Collect documented data on all aspects of the project (e.g. physical, biological and socio economic); and
- Review in detail any existing studies, environmental legislation, environmental and social studies including gender analyses, and review of technical documents related to the project.

8.1.4 Field Site Surveys

Field site surveys formed part of the preparation of the ESIA report. The main objective of this activity was to carry out on-site field assessments of the expected effects of the planned developments on the physical, biological and socio-economic environment. During these surveys, interviews, administration of questionnaires were carried out with key informants who included government institutions, local leaders and community representatives.

8.1.5 Literature Review

This included studying relevant legislation and policies; national, regional and local secondary (collated) data sources; development plan, Tutume Sub-District Selected Indicators Report, and national programs; and other related reports and documents related to the sub-project and World Bank safeguards policies on ESIA and associated guidelines. These were critical for appreciation of the different aspects of the environmental settings of the project area. It was also used to identify the legislative instruments that govern the various aspects of the receiving environment. The review of existing literature and collection of baseline information for the sub-project was undertaken with the aim to familiarize the specialists with and gain insights into the sub-project area. The review also served to contextualize how the greater area would be affected by the implementation of the sub-project. In addition, a review of relevant, policies, plans, programmes, and legislation, that has a significant bearing on the implementation of the proposed sub-project, was undertaken.

8.1.6 Establishing Baseline

The socio-economic baseline has been established from secondary data, consultations conducted and observations on-site. As far as has been possible, the focus for the socio-economic baseline has been on data collection, literature review, and observations in the beneficiary communities.

8.1.7 Secondary and Primary Data

Secondary data was obtained from books, reports, journals, and other sources such as Central Tutume District Report, Tutume Sub-District Selected Indicators among others. Primary data was collected from key informants and consultations which included the following:

- Tutume Sub-District Council
- Nata Sub-Land-Board
- Tribal Administrations for all the villages
- District HIV and AIDS Coordinating Office
- District Health Management Team
- Village Development Committees
- Tebelopele

8.1.8 Stakeholder Mapping and Public Consultations

The study team, consulted with stakeholders through meetings, focus groups, and questionnaires. Stakeholders consulted include, government institutions, community leaders, relevant organizations involved directly and indirectly with the proposed project to seek their views on the impacts (adverse and beneficial) of the proposed project on the environment and socio-economic characteristics of the project area.

8.1.9 Data Analysis

The purpose of data analysis was to identify impacts that would arise from the construction and operation of the proposed project. The significance of impacts was determined by combining the perceived frequency of occurrence of the source of the impact, the duration, severity, and spatial extent of the impact and the sensitivity of the area being impacted upon. The analysis was aided by using a summary criterion and classification. Mitigation measures and ESMP were designed based on the understanding of the identified impacts coupled with the knowledge and collected information about the project sites.

8.1.10 Early Identification and Prioritization of Impacts and Mitigation Measures

The primary tool for identification of impacts and mitigations was a discussion among members of the ESIA team using expert judgment and consultations including recommendations from stakeholders. This records the rationale for the impacts and their potential significance, mitigation measures, linked to relevant legislation, the construction contract requirements and the provisions of the ESMP. Impacts were identified from the environmental and socioeconomic baseline as affecting the receptors air, water, land, flora and fauna and the community. These were further categorized into construction and operational impacts.

The ESIA includes a description of the measures envisaged to prevent, reduce and where possible alleviate any significant adverse impacts on the environment. The identification of such measures is an iterative process which needs to be undertaken in parallel with the design to aid the incorporation of measures into the design during project development. Early adoption of appropriate mitigation will help reduce significant environmental impacts to a practicable minimum.

8.1.11 Determination of Significance

The assessment of the significance of impacts and identification has taken account of any incorporated mitigation measures adopted by the project and is largely dependent on the extent and duration. The criteria for determining significance are specific for each environmental and social aspect and are reported within each impact assessment chapter but generally for each impact the magnitude is defined. As part of this ESIA approach, an ESMP has been produced for each of the key stages of the development. These plans essentially set the framework for the Environmental and Social Management System for the project moving forward.

8.1.12 Impact Matrix Method

This approach is used to identify potential environmental impacts associated with the project. It assists in performing a comprehensive review of the variety of interactions between project activities and environmental parameters to identify environmental factors relating to development activities with all the specified environmental aspects.

The impact evaluation methodology adopted for this study is based on international best practice and the guidelines for preparing EIAs in Botswana. **Table 62** summarizes the criteria adopted for impact prediction and rating scales, while **Table 63** provides a Convention for Assigning a Consequence Rating and **Table 64** provides a guide on Convention for Assigning a Significance Rating.

Table 62: Impact Prediction Criteria and Rating Scales

Criteria	Rating Scales
Cumulative impacts (incremental impacts of the activity and other past, present and future activities on a common resource)	<ul style="list-style-type: none"> • Low (there is still significant capacity of the environmental resources within the geographic area to respond to change and withstand further stress). • Medium (the capacity of the environmental resources within the geographic area to respond to change and withstand further stress is reduced). • High (the capacity of the environmental resources within the geographic area to respond to change and withstand further stress has been or is close to being exceeded).
Nature	<ul style="list-style-type: none"> • Positive • Negative • Neutral
Extent (the spatial limit of the impact)	<ul style="list-style-type: none"> • On-site: Impacts that are limited to the boundaries of the development site. • Local: Impacts that affect an area in a radius of 2-3km around the development site. • Regional: Impacts that affect regionally important environmental resources or are experienced at a regional scale, in a radius of 4 – 6km around project site, as determined by administrative boundaries, habitat type/ecosystem. • National: Impacts that affect nationally important environmental resources or affect an area that is nationally important/ or have macro-economic consequences. (may include international spatial extent)
Intensity (the severity of the impact)	<ul style="list-style-type: none"> • Low - where the impact affects the environment in such a way that natural, cultural and social functions and processes are minimally affected. • Medium - where the affected environment is altered but natural, cultural and social functions and processes continue albeit in a modified way; and valued, important, sensitive or vulnerable systems or communities are negatively affected. • High - where natural, cultural or social functions and processes are altered to the extent that it will temporarily or permanently cease; and valued, important, sensitive or vulnerable systems or communities are substantially affected.
Duration (the predicted lifetime of the impact)	<ul style="list-style-type: none"> • Short-term (0 to 5 years) • Medium-term (6 to 40 years) • Long-term (over 40 years) - where the impact will cease after the operational life of the activity either because of natural processes or by human intervention.
Probability (the likelihood of the impact occurring)	<ul style="list-style-type: none"> • Improbable – where the possibility of the impact occurring is very low • Probable – where there is a good possibility (<50% chance) that the impact will occur. • Highly probable – where it is most likely (50-90% chance) that the impact will occur. • Definite – where the impact will occur regardless of any prevention measures (>90% chance of occurring).

Criteria	Rating Scales
Non-reversibility (ability of the impacted environment to return to its pre-impacted state once the cause of the impact has been removed)	<ul style="list-style-type: none"> • Low (impacted natural, cultural or social functions and processes will return to their pre-impacted state within the short-term). • Medium (impacted natural, cultural or social functions and processes will return to their pre-impacted state within the medium- to long-term). • High (impacted natural, cultural or social functions and processes will never return to their pre-impacted state).
Impact on irreplaceable* resources (is an irreplaceable resource impacted upon)	<ul style="list-style-type: none"> • Yes • No
Confidence level (the specialist's degree of confidence in the predictions and/or the information on which it is based)	<ul style="list-style-type: none"> • Low • Medium • High

Once the impacts are assessed according to the criteria in **Table 63**, a consequence rating will be applied, as per the convention shown in **Table 64**. The consequence of each potential impact is determined according to the extent, duration, and intensity of that impact. This assessment will be done initially for the scenario where no mitigation measures are implemented. Mitigation measures will then be identified and considered for each impact and the assessment repeated in order to determine the significance of the residual impacts (i.e. the impact remaining after the mitigation measure has been implemented).

The overall significance of the impacts will then be defined based on the results of a combination of the consequence rating and the probability rating set out in **Table 64**.

Table 63: Convention for Assigning a Consequence Rating

Consequence Rating	Intensity, Extent and Duration Rating
HIGH Consequence	<ul style="list-style-type: none"> • High intensity at a regional level and endure in the long term • High intensity at a national level and endure in the medium term • Medium intensity at a national level and endure in the long term • High intensity at a regional level and endure in the medium term • High intensity at a national level and endure in the short term • Medium intensity at a national level and endure in the medium term • Low intensity at a national level and endure in the long term • High intensity at a local level and endure in the long term • Medium intensity at a regional level and endure in the long term
MEDIUM Consequence	<ul style="list-style-type: none"> • High intensity at a local level and endure in the medium term • Medium intensity at a regional level and endure in the medium term • High intensity at a regional level and endure in the short term • Medium intensity at a national level and endure in the short term • Medium intensity at a local level and endure in the medium term • Medium intensity at a local level and endure in the long term • Low intensity at a national level and endure in the medium term • Low intensity at a regional level and endure in the long term

Consequence Rating	Intensity, Extent and Duration Rating
LOW Consequence	<ul style="list-style-type: none"> • Low intensity at a regional level and endure in the medium term • Low intensity at a national level and endure in the short term • High intensity at a local level and endure in the short term • Medium intensity at a regional level and endure in the short term • Low intensity at a local level and endure in the long term • Low intensity at a local level and endure in the medium term • Low intensity at a regional level and endure in the short term • Low to medium intensity at a local level and endure in the short term

Table 64: Convention for Assigning an Impact Significance Rating

Significance Rating	Consequence x Probability
HIGH Significance	<ul style="list-style-type: none"> • High x Definite • High x Highly Probable • High x Probable • High x Improbable • Medium x Definite
MEDIUM Significance	<ul style="list-style-type: none"> • Medium x Highly Probable • Medium x Probable
LOW Significance	<ul style="list-style-type: none"> • Medium x Improbable • Low x Definite • Low x Highly Probable • Low x Probable • Low x Improbable

Source: Dept of Environmental Affairs and Tourism, 2002, *Determining the Significance of Environmental Issues, South Africa*

Environmental Modeling

BOS: 498:2012 Ambient Air Quality-Limit for common pollutants. This standard specifies limit values for common air pollutants to ensure that the negative effects of such pollutants on human health and the environment are prevented or reduced.

Chemical pollutants. Common air pollutants shall comply with the requirements specified in **Table 65**. The volume of the pollutant to be analyzed should be standardized at a temperature of 25 degrees Celsius and pressure of 101.3 kPa.

Table 65: BOS 498: 2012 Limit Values for Common Air Pollutants

Pollutant	Limit Value ($\mu\text{g} / \text{m}^3$)	Average Period	Permitted Exceedences Each Year
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Sulphur Dioxide (SO₂)	350	1 hour	24
	125	24 hours	3
Nitrogen dioxide (NO₂)	200 40	1 year	N/A
Carbon Monoxide (CO)	30 000	1 hour	N/A
	10 000	8 hours	N/A
Particulate Matter (PM₁₀)	200	Monthly	N/A
	100	1 year	25 days average over 3 years
Ozone (O₃)	120	8 hours	
Lead (Pb)	0.5	1 year	N/A
Benzene (C₆H₆)	5	1 year	N/A

Dust deposition. The four -band scale outlined in **Table 66** shall be used in the evaluation of dust deposition. Dust deposition rates shall be expressed in units of mg m⁻² day⁻¹ over a 30d averaging period.

Table 66: Four Band Scale Evaluation Criteria for Dust Deposition

Band Number	Band Description Label	Dust Fall Rate (mg m ² day ⁻¹ , 30 d Average)	Comment
1	Residential	D < 600	Permissible for residential and light industrial
2	Industrial	600 < D < 1 200	Permissible for heavy commercial and industrial
3	Action	120 < D < 2 400	Requires investigation and remediation if two sequential months lie in this band, or more than 3 occur in a year
4	Alert	2 400 < D	Immediate action and remediation required following the first incidence of the dustfall rate being exceeded. Incident report to be submitted to the relevant authority

Comparison method

The comparison method is used to assess the environmental issues such as effluent quality, air quality, and water contamination. This is done based on the affected environment and standards as well as the related studies. Comparison is used to assess environmental impacts, and current status by comparing baseline data, and the environmental monitoring data collected during or post project. Baseline data provides the historical point of reference for the next steps of project monitoring and evaluation. This stage comes into play once the project is commissioned. It checks to ensure that the impacts of the project do not exceed the legal standards and implementation of the mitigation measures are in the manner as described in the environmental assessment report. Alternatives are also analysed and compared, then the best alternative is chosen with a justification.

Method of Public Consultation

- Project Information Dissemination

Appointments with the respective *Dikgosi* were made and confirmed through telephone calls.

- Methods of Engagement

Kgotla meetings were carried out with the project communities at different dates and times to solicit views regarding the proposed project. Consultations with residents near the project area, and Institutional stakeholders were carried out through questionnaires.

Method of information and Data Inheritance, Summary and Analysis

This method was used to identify and assess natural conditions and socio-economic conditions of the project area through data and information collected from various sources such as pre-design report, development plans, regional baseline environment and previous environmental assessment studies done regarding this ESIA.

Identification method. This method is applied through the following aspects:

- Description of baseline environment
- Policy, legal and administrative framework relevant to the project
- Environmental impacts

System analyzing method. Identification and description of environmental issues including the definable impacts, and causes has been captured in **Chapter 9**. This method is applied on the basis of considerations of sources of impacts and affected environmental components.

Consensus method. Methods and techniques for identifying, measuring, and assessing impacts rely on expert judgement. Information, matrices, and models used in this report represent experience accumulated by the ESIA team of specialists. The specialists were heavily involved in all aspects of the assessment — they identified the potential for significant impacts, plan data collection and monitoring programs, provided their judgement on the level of significance for specific impacts, and suggest ways of reducing or preventing impacts.

Impact Matrix method. Potential impacts were identified from key issues raised from previous studies, during the public participation process and from field investigations by the ESIA team of specialists.

The impacts will be split between pre-construction, construction, operation and decommission phases and tabulated. The identified impacts will be assessed to ascertain their significance. Mitigation measures will be suggested to enhance the positive and to reduce the potentially negative impacts. Some of the critical questions, which should be addressed include:

- What impacts (social, economic, and environmental) will result from the construction of the water transfer scheme?
- What will be the extent, magnitude, and duration of those impacts?
- How significant will those impacts be within the local and national contexts?
- What can be done to mitigate, reduce or avoid altogether the adverse impacts identified, and to enhance the positive impacts?

The assessment will include an evaluation of the results to the above questions, and will, where possible, include quantification and costing of the impacts and their remedial measures.

9. IMPACT IDENTIFICATION AND MITIGATION MEASURES

9.1 Introduction

The study identified several environmental impacts, and they are highlighted in this chapter along with the suggested mitigation measures.

9.2 Categorization of Impacts

There are several identified impacts for all the typical project stages of this proposed sub-project and the majority are adverse while there are a few positive impacts as well (**Table 67**). Most of the impacts have a short- term duration which means the environment will return to its normal state past construction. Most of the impacts affect a large portion of the region since the project covers most of the villages especially due to the water transmission pipelines. Most of the adverse impacts are avoidable and reversible while the positive impacts are irreversible (**Table 68**).

Table 67: Description of Impacts

Phase	Environmental Aspect	Potential Environmental Impact	Impact Significance Rating (e.g., Low, Moderate, High)		Impact Significance (Negative, Neutral, Positive)
			Before Mitigation	After Mitigation	
Pre-construction and Construction Positive Impacts					
Socio-economic					
		Provision of unskilled, semi-skilled and skilled employment	Low	High	Positive
		Enhanced socio-economic development (livelihoods improvement)	Low	High	Positive
Pre-construction and Construction Phase Negative Impacts					
Waste Management					
		Improper waste handling and disposal	Moderate	Low	Negative
Socio-economic					
		Disruption of public routes or access	High	Low	Negative
		Damage to property due to vibrations caused by blasting	High	Moderate	Negative
		Erosion of societal norms and values	Moderate	Low	Negative
		Possible increase in STIs and HIV/AIDS infections	High	Moderate	Negative
		An increase in COVID-19 and other viral disease prevalence rates	High	Low	Negative
		Potential increase in GBV, SEA, SH and VAC	Moderate	Low	Negative
		Encroachment of pipe infrastructure into people's residence/properties due to inadequate servitudes.	Moderate	Low	Negative
Occupational Health and Safety					
		Potential accidents and injuries	High	Low	Negative
		Potential trench collapse (cave-ins)	Moderate	Low	Negative
		Increased traffic and road traffic related accidents	Moderate	Low	Negative
		Risks due to unplanned emergencies	High	Moderate	Negative

Phase	Environmental Aspect	Potential Environmental Impact	Impact Significance Rating (e.g., Low, Moderate, High)		Impact Significance (Negative, Neutral, Positive)
			Before Mitigation	After Mitigation	
		Noise pollution	Moderate	Low	Negative
		Dust pollution	Moderate	Low	Negative
	Soil				
		Soil erosion	Moderate	Low	Negative
		Groundwater contamination	Moderate	Low	Negative
		Soil vulnerability to landslide and ground subsidence	Moderate	Low	Negative
	Biophysical				
		Loss of vegetation (clearing of rights-of-way and water infrastructure construction)	Moderate	Low	Negative
		Increased risk of illegal procurement of biodiversity	High	Low	Negative
		Elevated risk of increased incidents of negative human wildlife interaction (HAC)	Moderate	Low	Negative
		Wildlife habituation and modification of behaviour	Moderate	Low	Negative
		Increased risk of wildlife mortality due to pitfalls	High	Low	Negative
		Increased incidents of veldt fires	High	Low	Negative
		Pollution of the natural environment	Moderate	Low	Negative
		Uninformed destruction of archaeological materials	Moderate	Low	Negative
Operation Phase					
Positive Impact					
	Socio-economic				
		Improved livelihoods due to water availability	Low	High	Positive
Negative Impacts					
	Water Resources				
		Groundwater over-mining (Depletion)	High	Low	Negative
		Water supply disruptions due to vandalism/theft of infrastructure	High	Low	Negative
		Risks due to unplanned emergencies	High	Moderate	Negative
		Potential risk of groundwater pollution from discharges of brine effluent (with high salt concentration) due to leakages from the evaporation ponds or feeder pipes.	Moderate	Low	Negative
		Potential risk of groundwater and environmental pollution from discharges of sludge and effluent (from pre-treatment) to the environment from leakages from pipes.	Moderate	Low	Negative
		Potential drowning of animals accessing the evaporation ponds area	Moderate	Low	Negative
Decommissioning Phase					
Positive Impact					
	Socio-economic				

Phase	Environmental Aspect	Potential Environmental Impact	Impact Significance Rating (e.g., Low, Moderate, High)		Impact Significance (Negative, Neutral, Positive)
			Before Mitigation	After Mitigation	
		Provision of unskilled, semi-skilled and skilled employment	Low	High	Positive
Negative Impacts					
Socio-economic					
		Improper waste handling and disposal	Moderate	Low	Negative
		Possible increase in STIs and HIV/AIDS infections	High	Moderate	Negative
		An increase in Covid-19 and other viral disease prevalence rates	High	Low	Negative
Occupational Health and Safety					
		Potential accidents and injuries	High	Low	Negative
		Increased traffic and road traffic related accidents	Moderate	Low	Negative
		Noise pollution	Moderate	Low	Negative
		Dust pollution	Moderate	Low	Negative
		Soil erosion	Moderate	Low	Negative
		Groundwater contamination	Moderate	Low	Negative
Biophysical					
		Loss of vegetation (clearing of rights-of-way and water infrastructure construction)	Moderate	Low	Negative
		Loss of vegetation (clearing of rights-of-way and water infrastructure construction)	Moderate	Low	Negative
		Increased risk of illegal procurement of biodiversity	High	Low	Negative
		Elevated risk of increased incidents of negative human wildlife interaction (HAC)	Moderate	Low	Negative
		Wildlife habituation and modification of behaviour	Moderate	Low	Negative
		Increased risk of wildlife mortality due to pitfalls	High	Low	Negative
		Increased incidents of veldt fires	High	Low	Negative
		Pollution of the natural environment	Moderate	Low	Negative

Table 68: Impact Assessment

Impact	Avoidable	Duration	Spatial Scale	Reversible/Irreversible	Cumulative/Non-Cumulative	Direct/Indirect
Pre-construction and Construction Positive Impacts						
Provision of unskilled, semi-skilled and skilled employment	No	Short-term	Regional	Irreversible	Non-cumulative	Direct
Enhanced socio-economic development (livelihoods improvement)	No	Permanent	Regional	Irreversible	Non-cumulative	Indirect
Pre-construction and Construction Phase Negative Impacts						
Improper waste handling and disposal	Yes	Short-term	Regional	Reversible	Non-cumulative	Direct
Disruption of public routes or access	No	Short-term	Regional	Reversible	Non-cumulative	Direct
Erosion of societal norms and values	Yes	Short-term	Regional	Irreversible	Cumulative	Indirect
Possible increase in STIs and HIV/AIDS infections	Yes	Permanent	Regional	Irreversible	Cumulative	Indirect
An increase in COVID-19 and other viral disease prevalence rates	Yes	Short-term	National	Reversible	Cumulative	Indirect
Potential increase in GBV, SEA, SH and VAC	Yes	Short-term	Regional	Irreversible	Cumulative	Indirect
Encroachment of pipe infrastructure into people's residence/properties due to inadequate servitudes	No	Short-term	Regional	Reversible	Non-cumulative	Direct
Potential accidents and injuries	Yes	Short-term	Regional	Irreversible	Non-cumulative	Indirect
Potential trench collapse (cave-ins)	Yes	Short-term	Regional	Reversible	Non-cumulative	Indirect
Increased traffic and road traffic related accidents	Yes	Short-term	Regional	Irreversible	Non-cumulative	Indirect
Risks due to unplanned emergencies	No	Short-term	Regional	Irreversible	Cumulative	Indirect
Noise pollution	No	Short-term	Regional	Reversible	Non-cumulative	Direct
Dust pollution	No	Short-term	Regional	Reversible	Non-cumulative	Direct
Soil erosion	Yes	Short-term	Regional	Reversible	Non-cumulative	Indirect
Damage to property due to vibrations caused by blasting	No	Short-term	Local	Irreversible	Non-cumulative	Direct
Groundwater contamination	Yes	Long-term	Regional	Irreversible	Cumulative	Indirect
Soil vulnerability to landslide and ground subsidence	Yes	Long-term	Local	Irreversible	Cumulative	Indirect
Loss of vegetation (clearing of rights-of-way and water infrastructure construction)	No	Short-term	Regional	Reversible	Non-cumulative	Direct
Increased risk of illegal procurement of biodiversity	Yes	Short-term	Regional	Reversible	Non-cumulative	Indirect
Elevated risk of increased incidents of negative human wildlife interaction (HAC)	Yes	Short-term	Regional	Reversible	Non-cumulative	Indirect
Wildlife habituation and modification of behavior	Yes	Short-term	Regional	Reversible	Non-cumulative	Indirect
Increased risk of wildlife mortality due to pitfalls	No	Short-term	Regional	Reversible	Non-cumulative	Indirect

Impact	Avoidable	Duration	Spatial Scale	Reversible/Irreversible	Cumulative/Non-Cumulative	Direct/Indirect
Increased incidents of veldt fires	Yes	Short-term	Regional	Reversible	Non-cumulative	Indirect
Pollution of the natural environment	Yes	Short-term	Regional	Reversible	Non-cumulative	Indirect
Uninformed destruction of archaeological materials	Yes	Short-term	Regional	Irreversible	Non-cumulative	Indirect
Operation Phase						
Risks due to unplanned emergencies	No	Short-term	Regional	Irreversible	Cumulative	Indirect
Improved livelihoods due to water availability	No	Long-term	Regional	Reversible	Cumulative	Indirect
Groundwater over-mining (Depletion)	Yes	Long-term	Regional	Reversible	Non-cumulative	Direct
Water supply disruptions due to vandalism/theft of infrastructure	Yes	Long-term	Regional	Reversible	Cumulative	Direct
Potential risk of groundwater pollution from discharges of brine effluent (with high salt concentration) due to leakages from the evaporation ponds or feeder pipes.	Yes	Long-term	Regional	Irreversible	Cumulative	Indirect
Potential risk of groundwater and environmental pollution from discharges of sludge and effluent (from pre-treatment) to the environment from leakages from pipes.	Yes	Long-term	Regional	Irreversible	Cumulative	Indirect
Potential drowning of animals accessing the evaporation ponds area	Yes	Short-term	Regional	Irreversible	Non-cumulative	Indirect
Decommissioning Phase						
Provision of unskilled, semi-skilled and skilled employment	No	Short-term	Regional	Irreversible	Non-cumulative	Direct
Improper waste handling and disposal	Yes	Short-term	Regional	Reversible	Non-cumulative	Direct
Possible increase in STIs and HIV/AIDS infections	Yes	Permanent	Regional	Irreversible	Cumulative	Indirect
An increase in Covid-19 and other viral disease prevalence rates	Yes	Short-term	National	Reversible	Cumulative	Indirect
Potential accidents and injuries	Yes	Short-term	Regional	Irreversible	Non-cumulative	Indirect
Noise pollution	No	Short-term	Regional	Reversible	Non-cumulative	Direct
Dust pollution	No	Short-term	Regional	Reversible	Non-cumulative	Direct
Soil erosion	Yes	Short-term	Regional	Reversible	Non-cumulative	Indirect
Groundwater contamination	Yes	Long-term	Regional	Irreversible	Cumulative	Indirect
Loss of vegetation (clearing of rights-of-way and water infrastructure construction)	No	Short-term	Regional	Reversible	Non-cumulative	Direct
Increased risk of illegal procurement of biodiversity	Yes	Short-term	Regional	Reversible	Non-cumulative	Indirect
Elevated risk of increased incidents of negative human wildlife interaction (HAC)	Yes	Short-term	Regional	Reversible	Non-cumulative	Indirect

Impact	Avoidable	Duration	Spatial Scale	Reversible/Irreversible	Cumulative/Non-Cumulative	Direct/Indirect
Wildlife habituation and modification of behavior	Yes	Short-term	Regional	Reversible	Non-cumulative	Indirect
Increased risk of wildlife mortality due to pitfalls	No	Short-term	Regional	Reversible	Non-cumulative	Indirect
Increased incidents of veldt fires	Yes	Short-term	Regional	Reversible	Non-cumulative	Indirect
Pollution of the natural environment	Yes	Short-term	Regional	Reversible	Non-cumulative	Indirect

9.3 Social Impact Assessment

9.3.1 Provision of Unskilled, Semi-Skilled and Skilled Employment – Pre-Construction, Construction, Operation and Decommissioning

The construction phase is expected to attract unskilled, semi-skilled and skilled professionals. The local communities should benefit from openings requiring less skill sets which will boost the local economy (villages). This notwithstanding, employment creation during the construction is short term and temporary. Employment of local manpower during this phase will facilitate skills training and transference which will in turn improve their employability elsewhere when construction ends.

Suggested Mitigation Measures

1. Contractor should notify communities of job opportunities at start up and types and number of labourers and skilled people required.
2. Recruitment process to adhere to labour procedures and policies.
3. Advertising employment opportunities locally.
4. Development of a recruitment strategy that takes into consideration locally available skills.
5. Implementation of labour intensive rather than capital intensive work methods wherever possible.
6. The Contractor to be encouraged to procure goods and services from local service providers.
7. Education and training of employees to enable skills transfer.

9.3.2 Enhanced Socio-Economic Development (Livelihoods Improvement) – Construction and Operation

Due to the limited resources in project area villages, the major source of livelihood in the villages are natural resource-based activities such as harvesting *mogwana* (*Grewia monticola*), mopane worms (*Gonimbrasia belina*) and firewood. During consultations the communities stated that *Mogwana* berries are sold and can also be used to make traditional beer (*khadi*), other forms of livelihood are arable farming and government hand-outs. As indicated in the report, improved water supply in the project area will improve livelihoods and reduce dependency on natural resources and government hand-outs. According to the WHO, improved water supply and water resources management boosts countries' economic growth and contributes greatly to poverty eradication. WHO further asserts that among the world's poor countries, those with access to improved water experience greater economic growth. Poor countries with improved access to clean water services enjoyed annual average growth of 3.7% while poor countries with the same per capita income but without improved access had an average annual per capita GDP growth of only 0.1%. In this regard, improved water supply in the project area will contribute significantly to increased production and productivity within economic sectors.

Suggested Mitigation Measures

1. Implement a water supply strategy that is reasonably priced to ensure adequate, reliable, and sustainable water supply system for the villages.
2. Uphold measures geared towards citizen empowerment and skills transfer.
3. Embark on social responsibility projects to uplift livelihoods.
4. Optimise and upgrade water transmission infrastructure for reticulation efficiency.
5. The Contractor to be encouraged to procure goods and services from local service providers.

9.3.3 Disruption of Public Routes or Access – Construction

The excavation of trenches for the installation of water pipes and associated infrastructure may result in social disruptions such as blocked access to social facilities and services. Social disruptions will be felt mostly during excavation of trenches along access roads, at road crossings and in front of homesteads. Social disruptions are known to have adverse psychological, economic, and social implications especially on those households and businesses that can be temporarily interrupted therefore it is imperative that all issues relating to interruptions should be addressed prior to commencement of the construction phase.

Suggested Mitigation Measures

1. Restore, to the extent possible, any public infrastructure or amenities that are disrupted to enable continued access.
2. Pedestrian crossing points must be constructed according to prevailing population density/location of social infrastructure along trenches.
3. Provide temporary crossing over the excavated trenches to facilitate ease of access. Red danger tape should be placed along the trenches, and it should be visible to residents and motorists.
4. All open trenches should be backfilled as soon as possible to avoid injuries to people, livestock, and wildlife in the project area.
5. All open trenches should be marked off with danger warning tapes.
6. Excavated areas should be cordoned off with reflective danger warning signage and trenches should be covered within 12 hours.
7. Provide an avenue for complaints by the public (i.e., GM) and make the public aware of this mechanism.

9.3.4 Vibrations from Blasting Works

Blasting is the most accepted and practiced technique for the breakage of rock. Rock breakage during blasting process is accompanied by the generation of ground vibrations, noise, dust, fumes and fly rock. The ground vibrations, pose a great challenge to the safety of the nearby structures and the people. Houses are more prone to cracks and damage due to the vibrations. Ground vibrations may also develop a fear factor in the nearby communities.

Suggested Mitigation Measures

1. Baseline seismography monitoring should be undertaken at an early stage since blasting may induce seismic activity underground.
2. Ensure requirements for human health and safety relating to blasting are adhered to avoid unnecessary damage to infrastructure.
3. The developer should monitor blasting extensively and report the outcomes to regulators and analysing results to help minimise impacts.
4. Noise control devices, such as temporary noise barriers and deflectors for impact and blasting activities should be used.
5. Workers should be provided with protective clothing and equipment
6. Explosives or blasting agents shall not be abandoned
7. Properly handle explosives according to current procedures.
8. Prevent unauthorized persons from entering the blast site.
9. Ensure proper placement of barricades and appropriate signage around the blast site.

10. Before laying out any blasting supplies, the blast site shall be barricaded and posted with explosive signs to prevent unauthorized entry.

9.3.5 Erosion of Societal Norms and Values and Gender Based Violence (GBV) - Construction

The presence of migrant workers from diverse social backgrounds during the construction phase is likely to result in the disruption of community values and norms. A population increase in the project area due to pull factors such as employment opportunities and improved buying power will result in social ills such as alcoholism, prostitution, teenage pregnancy, family breakdowns, crime and increase in violence against women and children. GBV can be physical, sexual, emotional, financial or structural, and can be perpetrated by intimate partners, acquaintances, strangers and institutions. Most acts of interpersonal gender-based violence are committed by men against women, and the man perpetrating the violence is often known by the woman, such as a partner or family member.

It is more likely for GBV incidences to occur in project villages during the project implementation as there will be cash flow in the community. It is common for women who do not have sources of income to engage in sexual relationships with men who can support them. This often leads to women staying in abusive relationships just for the sake of financial support.

Suggested Mitigation Measures

1. Raise awareness amongst the local communities on various social ills, GBV and their implications.
2. Sensitise the construction workers on community values and norms.
3. Participate in local crime prevention activities.
4. Liaise closely with the police and other crime law enforcement authorities to address crime and social problems.
5. Make available GBV information and learning materials at the project sites.
6. Provide counselling services for GBV victims, survivors and perpetrators as and when needed.
7. Implement a Code of Conduct for prevention for GBV.

9.3.6 Possible Increase in STI and HIV/AIDS Infections – Construction and Decommissioning

An influx of people during the construction phase of the sub-project is likely to increase the number of people with HIV and AIDs as it is highly probable that among new arrivals, there will be people who have STIs. The proposed sub-project will likely introduce an influx of about 100 people in the project area during various stages of the project. The interaction between new arrivals and the inhabitants of the host villages is most likely to lead to a further increase in the number of people infected by HIV/AIDS. The new arrivals will comprise workers who earn cash income and possibilities of transactional sex, commercial sex and alcohol use may predispose more people to STI infections.

Suggested Mitigation Measures

1. Set up HIV and AIDS structures in the communities (project areas) to intensify HIV/AIDS awareness campaigns in the project villages.
2. Provide STI screening and treatment on-site for early diagnosis.
3. Ensure availability and access to condoms in the workplace.
4. Provide behaviour change communication materials on-site and in the nearby communities.

5. Empower local authorities and services providers to help in the fight against the spread of HIV and AIDS.
6. Assist in intensifying HIV/AIDS awareness campaigns at the project villages.
7. Provide health facilities and services e.g., HIV testing and counselling, ARV treatment.
8. Implement project specific Code of Conduct on HIV/AIDS.
9. Place condoms in strategic locations where they are accessible to workers.

9.3.7 An Increase in COVID-19 and Other Viral Disease Prevalence Rates – Pre-construction, Construction and Decommissioning

Due to labour influx this sub-project is likely to lead to increases in the spread of COVID-19 and other viral diseases within the sub-project communities. This can severely impact the health and wellbeing of community members and workers and increase poverty (especially because of loss of income) and adversely impact social cohesion. An outbreak of COVID-19 has a risk of negatively affecting sub-project progress due to quarantines and self-isolations as per COVID-19 protocols.

Suggested Mitigation Measures

- Provide wash basins with soap at all the sub-project sites to prevent the spread of COVID-19¹⁷ within the communities.
- Design the contractor and labourer's camp to avoid the spread of the disease.
- Conduct awareness sessions in the communities and for sub-project workers on the disease and its risks, as well as the major drivers of COVID-19 spread such as poor sanitation, physical contact, and airborne transfer by formally engaging the Ministries of Health and Wellness, Nationality, Immigration and Gender Affairs to harness existing and integrate existing COVID-19 programmes into the sub-project.
- Provide isolation facilities for confirmed COVID-19 cases.
- Develop materials that seeks to promote awareness, good hygiene behavior and social distancing.
- Engage the village clinics to provide monthly onsite health talks to provide and promote access to COVID-19 testing services.
- Ensure contractor enforces Codes of Conduct for COVID-19 and conducts awareness training on them to ensure all workers are aware of expected behaviours.
- Ensure the community is aware of the GM.

9.3.8 Potential Increase in Sexual Exploitation and Abuse (SEA), Sexual Harassment (SH) and Violence Against Children (VAC) – Pre-Construction and Construction

An influx of migrant labour within a community tends to increase various social ills which includes GBV, SEA, SH and VAC. This is normally bred by skewed employment opportunities which often places women in a position of dependency on men and ultimately results in various abuses. The sub-project will obviously introduce more money into the communities, and this will mean more consumption of alcohol and other associated drugs, and this tends to increase the potential for GBV, SEA, SH and VAC.

Suggested Mitigation Measures

- Raise awareness to sensitise the construction crew who are not from the region to respect community values and norms.

¹⁷ ESF/Safeguards Interim Note: COVID-19 Considerations in Construction/Civil Works Projects

- Comply with monitoring and reporting requirements as per the Codes of Conduct, including age restrictions on any sexual activity (under 18 years of age) and behaviors that constitute GBV, SEA, SH and VAC.
- Conduct awareness raising sessions among workers and the community about social ills that are likely to emerge due to interaction of locals with migrant workers.
- Liaise closely with the police and other crime law enforcement authorities, NGOs to address GBV, SEA, SH and VAC and other social problems that may be exacerbated by the project.
- Engage a GBV service provider to conduct an awareness talk periodically (monthly) on GBV, and their prevention and to provide services to GBV survivors.
- Train project-related staff and residents of the communities in behaviour obligations. To make this effective, all workers will be required to sign an Individual Code of Conduct as presented in **Annex 8**. Provide training and awareness sessions about the Codes of Conduct to enhance understanding among sub-project workers.
- Ensure women have equal opportunity to be hired as this could help address the problem of younger women getting into relationships for financial support and being abused in that process.
- Form a GBV, SEA, SH, and VAC team as per World Bank’s guidelines as presented in **Section 11**.
- Engage police in sensitization and awareness on GBV, SEA, SH, and VAC to ensure they are aware of procedures in place and need for survivor-centered procedures and to participate in community and worker training.

9.4 Land Use Impacts

9.4.1 Encroachment of the Pipe Infrastructure into People’s Residences Due to Inadequate Servitudes - Construction

There are various properties such as residential properties, ploughing fields and freehold farms along the road reserve. There are also some other linear services along the road reserve that should be avoided when designing and constructing the pipeline and therefore a potential for encroachment into private property is highly possible.

Suggested Mitigation Measures

1. Establish a good working relationship to allow access for maintenance purposes (where pipeline is too close to private property).
2. Physical inspection of plots against layout plans, and where there are discrepancies, undertake surveying of the plots and produce updated layout plan.
3. In case of relocation, compensation of affected plot owners should comply with Compensation Guidelines for Tribal Areas 2010 and the Environmental and Social Safeguard Policies of the World Bank Group.

9.5 Health and Safety

9.5.1 Potential Accidents and Injuries (Occupational Health) – Construction, Operation and Decommissioning

Accidents are common in any construction activity, and they result in injuries and loss of production time. Some accidents are genuine while others are due to carelessness or negligence and the impact is sometimes exacerbated by lack of Proper Personal Equipment (PPE). Medical care around the project villages is available but some activities will take place in remote areas such as construction of

pipelines. Hence provision of timeous and effective first aid treatment in case of an accident is necessary.

Work around the pipelines, pump stations, reservoir tank and elevated tanks will be physically demanding and will involve hazards such as trenches, working at heights and heavy equipment. Work during operation will involve entry into confined spaces, including manholes, pipelines, and pump station.

There is a potential for accidents and injuries associated with activities at the labourer's camps such as during cooking, tripping, and slipping, electrical accidents and fire hazards.

Suggested Mitigation Measures

1. Workers should have a standard overall, safety boots and hard hats to be allowed access to the construction sites. It should be the mandated standard PPE for every worker and its use should be monitored.
2. Implement a confined space entry program that is consistent with applicable national requirements.
3. Use fall protection equipment when working at heights.
4. Maintain work areas to minimise slipping and tripping hazards.
5. Use proper techniques for trenching shoring.
6. Implement fire prevention measures in accordance with internationally accepted standards
7. Prudent handling and storage of hazardous chemicals shall be enforced.
8. Various PPE should be provided for different hazardous work environment such as dust masks, gloves, safety goggles, ear plugs, safety harness etc.
9. Workers should be properly trained on safety measures on site.
10. A worker proficient and certified in first aid should always be available on site.
11. A fully equipped first aid kit should be available in all the construction vehicles and at the site office, as well as the Labourer's camps.
12. Workers should be provided with protective clothing such as boots and gloves.

9.5.2 Potential Trench Collapse (Cave-ins) - Construction

Trench collapse or cave-ins is one of the most injurious and fatal activities in construction and associated with excavations or trenching. The sub-project involves 189 km of trenching at a depth of between 1.5 m to 3 m depending on the topsoil. Health and Safety Executive Guidelines indicates that any trench with depths of 1.22 m or deeper is risky and needs attention to protect workers and the walls of the trench, depending on the soil type being worked and the surrounding conditions such as weather and vehicle movement. The sandy soils are most prone to trench collapse. Therefore, it will be a challenge in the study area to keep the soils or walls of the trenches stable and ensure worker's safety during excavations and pipe laying.

Suggested Mitigation Measures

- Employ a competent person to inspect trenching daily.
- Train workers on working safely in/ around trenches and early detection of potential trench collapse.
- Keep heavy equipment/ activities away from trench edges.
- Identify locations of underground utilities.
- Provide safe access and ingress to all excavations. This should be ladders and steps ramps at 2 km intervals and where necessary within the villages to access.

- Stockpiles of excavated materials should be put at minimum safe distance of 1 m from the edge of the trench.
- Protect workers and trenches by use of proper techniques for shoring or shielding.
- Prevent community members (especially children) and animals from entering the construction area with open trenches.
- Minimise the length of open trenches at any one period and backfill trenches as soon as possible.

9.5.3 Increased Traffic and Road Traffic Related Accidents – Construction and Decommissioning

Although there is no estimation of traffic to be generated during the construction phase, vehicular movement in the project area especially at the project sites will increase due to the need to haul construction material and equipment to construction sites. In this regard, the haulage of construction materials has potential to give rise to traffic related accidents especially along turn-off junctions because heavy vehicles slow down and occupy both lanes and the entire stretch of the road. The risk of traffic accidents to livestock and wildlife will result in habitual poaching of wildlife in the area as a result of purposeful vehicular collisions on wildlife especially at night. Road traffic measures should be in place especially along gravel roads within villages.

Suggested Mitigation Measures

1. Traffic routes should avoid villages and other habited places as far as possible.
2. Routes should be demarcated, and all construction traffic made to use the designated routes, including visitors to the sites.
3. Speed limits should be appropriately designated especially within villages and high-risk areas (80 km/hr within the highways, 60 km/hr on dirt roads, 30 km/hr around the work sites and 40 km/hr within the village).
4. Construction vehicles need to be fitted with hazard lights, checked for road worthiness, fitted with reverse sirens.
5. Flagmen should be employed to direct and manage traffic in congested/dangerous traffic situations.
6. Truck drivers should have the necessary certificates/licenses to drive the trucks.
7. Behaviour of Contractor Road users should be monitored and offences penalised.
8. Deliveries to be made during low traffic peak hours and traffic routes should avoid villages and other habited places as far as possible.
9. Strategic routes should be demarcated, and construction traffic should use the designated routes including visitors to the sites.
10. Traffic warning signs must be placed strategically at road turn offs to warn oncoming traffic.
11. Truck drivers should be briefed on road traffic rules and regulations.
12. Trucks transporting large equipment or hazardous waste to be clearly marked.
13. Night driving should not be permitted.

9.5.4 Risks Due to Unplanned Emergencies – Construction and Operation

An emergency is an unplanned event when a project operation loses control, or could lose control, of a situation that may result in risks to human health, property, or the environment, either within the facility or in the local community. Emergencies do not normally include safe work practices for frequent upsets or events that are covered by occupational health and safety. Therefore, plans and

procedures must be developed and maintained for identifying the potential for, and responses to, incidents and emergency situations. Emergency in the case of operation could be chemical spills, broken water mains and power outages. Both construction and operation should have an Emergency Preparedness and Response Plan that is commensurate with the risks associated with both phases and should include the following elements:

- Administration (policy, purpose, distribution, definitions, etc)
- Organisation of emergency areas (command centers, medical stations, etc)
- Roles and responsibilities
- Communication systems
- Emergency response procedures
- Emergency resources
- Training and updating
- Checklists (role and action list and equipment checklist)
- Business Continuity and Contingency

Suggested Mitigation Measures

- Develop an Emergency Preparedness Plan to address the prevention and mitigate the environmental impact that is associated with emergency events.
- These procedures should be reviewed and tested periodically, as well as whenever an incident occurs.
- Operational risks for individual sites must be actively assessed to ensure that emergency response procedures prepare the sites to effectively respond to emergency situations. The risk assessment process should test planned responses and evaluate how effectively they deal with the consequences of an unplanned event.
- Develop a properly trained emergency response team staffed by operating personnel and led by a trained emergency response coordinator drawn from management-level personnel
- Proper emergency equipment must be identified and a program for practice drills must be developed to ensure response measures are effective and understood.

9.5.5 Noise Pollution – Pre-Construction, Construction and Decommissioning

Noise will be generated during vegetation clearance, vehicular movement (transportation of materials to site), site preparation and haulage of excess spoil, material, and waste. Excavations for trenches will require the use of earth moving machinery, transport of pipes to sites and movement of construction crew to work will generate some noise. Certain noise levels such as in **Table 69** will result in noise pollution which is unavoidable in the vicinity of construction sites, and it is normally acceptable for limited periods and at certain times. Excessive noise, particularly when experienced continuously, outside normal working hours can be a nuisance to both workers and the public. In extreme cases it may become a health hazard. Typical noise emissions for plant and equipment likely to be deployed during the construction phase are highlighted in **Table 69**. Night operations will therefore exceed these standards and most day operations will be uniformly excessive up to 20 m.

The most significant noise impacts will be generated at the construction sites of transmission mains within the villages along the road servitude/reserve, pump station and storage tanks within the villages.

Table 69: Noise Emission Levels for Various Types of Construction Plant

Type of Plant	Distance between Plant and Observer			Typical International Standard		EPA Limit
	5 m	20 m	50 m	Day	Night	
Loader	90	78	70	75	55	70
Grader	90	78	70	75	55	70
Vibration Roller	86	74	66	75	55	70
Bulldozer	86	74	66	75	55	70
Generator	98	86	78	75	55	70
Impact Drill	87	75	67	75	55	70
Concrete Mixer	91	79	71	70	55	70
Concrete Pump	85	70	62	70	55	70

Suggested Mitigation Measures

1. Employees must be provided with full PPE including ear plugs and masks.
2. PPE should be reserved for visitors.
3. Visitors should be given induction training before they are allowed entry into the sites.
4. Conduct toolbox talks for workers to raise awareness about the impacts of noise and how to minimise it.
5. Select equipment with lower sound power levels.
6. Install acoustic barriers to minimise the transmission of sound through the barrier.
7. Limit construction vehicle movement (especially trucks) to and from site to normal working hours only i.e., 6am to 6pm.
8. Maintenance of silencers on diesel powered equipment where necessary.
9. Systematic maintenance of all forms of equipment.

9.5.6 Dust Nuisance and Health Risks – Pre-Construction, Construction, Operation and Decommissioning

Various activities during all the sub-project phases have the potential to cause air pollution and its associated health risks in the immediate vicinity of the project area and its surroundings. Due to the clearance of vegetation, back filling activities and trucks hauling material to and from the site, dust will potentially become a nuisance to workers and surrounding residential, ploughing fields, freehold farms and cattle posts. This will be a more pronounced problem during the early construction phase when heavy machinery, such as bulldozers, will be undergoing site clearance, excavation of trenches, increased traffic on untarred roads, hauling of materials and levelling activities. Transportation of management and workers to and from site, labourer's camp and contractor's camp on untarred roads will generate some dust. Introduction of construction vehicles will result in an increase in traffic around the project area which also contributes to dust generation.

Suggested Mitigation Measures

1. Spray work areas, short access roads around pump stations and storage tanks with grey water to suppress dust.
2. Provide protective dust masks to workers and ensure that they are worn during all activities that generate dust.
3. Enforce speed limits on site in order to minimize dust pollution.
4. Visually monitor dust generation from work zones and implement dust suppression measures.
5. Minimise dust from open area sources, including storage piles, by using control measures such as installing enclosures and covers and increasing moisture content.

9.6 Soil Assessment

9.6.1 Soil Erosion – Pre-Construction, Construction and Decommissioning

Most of the soils in the project area are calcretised. The evaporation of calcium-bearing water has resulted in the precipitation of calcite within the sandy groundmass. Where it is poorly developed, the result is powdery calcrete which is very light and hence susceptible to erosion especially because of wind. Where it is well developed it lithifies the sand, resulting in hard, rubbly material which is much more resistant to erosion. The movement of construction machinery will cause the lithified hard material to crack or crumble and hence make it susceptible to erosion. Water lines will require flushing to remove accumulated sediments and impurities that accumulate in the pipe. The velocity from the discharged water has potential to cause erosion especially if the discharge area is susceptible to erosion.

Suggested Mitigation Measures

1. In areas where the soils are powdery and cannot be effectively compacted, a 5 cm layer of gravel has to be applied over the top of compacted trench material.
2. Erosion control measures should be implemented such as wetting down the site to control dust, covering/screening of stockpiles, positioning stockpiles in areas that are not prone to winds.
3. A silt curtain should be erected at the outlets at the new pump station site, to screen runoff water.
4. Minimise erosion during flushing by avoiding discharge areas that are susceptible to erosion and spread the flow to reduce flow velocities.

9.6.2 Soil Vulnerability to Landslide and Ground Subsidence – Construction and Operation

The project region's soils are mostly sandy soils, and although these non-cohesive soils are less susceptible to shrinkage and growth, they are more prone to being carried away by water flow as a result of accidental water pipe breaks or soil erosion. Subsidence may occur naturally or as a result of human activity. Subsidence is often produced by the addition or removal of water and vegetation, which when coupled with weight, slope angle, gravity, and geology, may result in a variety of subsidence problems. The sub-project includes water reservoirs and a reverse osmosis (RO) plant, which may place considerable weight on these soils. Water is a significant factor in subsidence and landslides, and its presence may have substantial consequences for the underlying soils and geology. Any leakage or broken water pipe resulting in significant water seepage may result in major damage to these structures.

Suggested Mitigation Measures

Geotechnical engineering investigates subsurface conditions and materials using soil and rock mechanics concepts. These principles define the essential physical and chemical features of soils and provide an assessment of the stability of natural slopes and man-made soil deposits. It is therefore, highly recommended that Geo-Technical engineers undertake the following measures:

- Prepare an investigation plan to investigate the subsurface conditions of these potential sites (water reservoirs and reverse osmosis (RO) plant).
- Propose the construction sequencing and any special arrangements necessary to complete the excavation and foundation works at these locations and they have to get approval from the appropriate authorities.
- Carryout an analysis of the envisaged impacts of excavation and construction works on nearby and adjacent structures (if any) and recommend safety measures and ways for their protection.

9.7 Water Resources

9.7.1 Groundwater Contamination – Construction and Decommissioning

On-site repairs or servicing of construction machinery presents a possibility of spillages and leakages of hydrocarbon products from construction equipment and storage facilities onto the ground. Fuel and other products are accessible from various project villages and hence it is not necessary to keep large amounts of fuel on site. Indiscriminate disposal of waste material (both liquid and solid) also exposes the soil to contamination, and this ultimately results in the pollution of groundwater through infiltration/recharge into the ground. This therefore makes shallow aquifers more susceptible to pollution.

Suggested Mitigation Measures

- Service construction vehicles and machinery regularly and properly to reduce breakdowns and seal any leakages.
- Servicing should be done on protected area where spillages can be contained (bunded area that is seepage free).
- Provide leak-proof receptacles or drums for storing used oil and they should be kept in a protected area.
- Portable spill containment and clean-up equipment should be provided at the project site.
- In the event of a spill, the Contractor shall take prompt action to clear the polluted area and prevent the spread of pollutants.

9.8 Identified Ecological Impacts

9.8.1 Loss of Vegetation (Clearing for Rights-of-Way for Pipeline and Infrastructure Construction) - Pre-Construction, Construction, Operation and Decommissioning

Construction of physical infrastructure of the magnitude of the proposed Sowa Water Supply Scheme always result in destruction and displacement of vegetation to give way to physical structures. Vegetation cover serves multiple ecological benefits including primary production, prevention of soil erosion, regulation of water flow, regulation of micro-climate and mitigation against climate change through storage of carbon. Land cleared for the water pipeline will also result in net reduction of habitat available for production of veldt products like mopane worm and firewood. The linear nature of water pipelines could also trigger landscape of fear for some species and hence alter wildlife behaviour.

Suggested Mitigation Measures

1. In the bid to reduce amount of vegetation clearing, and hence project's ecological footprint, consider aligning the pipeline route with existing vegetation-cleared routes, where technically feasible. For example, along existing roads, cut lines, firebreaks, water pipelines and disease control fence lines.
2. Perform a comprehensive systematic inventory of cleared vegetation with particular emphasis on plants of notable conservation significance, i.e., rare species and IUCN Red list classified species, if there are any within the sites.
3. Where practical, adjust the water pipeline to avoid large adult protected plant species, e.g., adult Mowana (*Adansonia digitata*) tree

9.8.2 Increased Risk of Illegal Procurement of Biodiversity – Construction and Decommissioning

Various natural resources are used in different ways by humans; food and meat products, medicinal/herbal remedies, firewood, ornamentals and spiritually. Consumption and preference for wildlife meat (bush meat) and natural herbal remedies are a common practice in Botswana. Extant Gallinaceous birds (spurfowl, francolins and guinea fowl), doves and small herbivores (impala, steenbok, and duiker) are popular sources of game meat. Mokgalo (*Ziziphus mocrunata*) is a typical examples of an extant plant species used in traditional remedies in Botswana. The mopane worm (*Gonimbrasia belina*), a popular protein source, is also seasonally common in the project area. Harvesting and collection of firewood, mopane worm, and any other veldt products is regulated by the Department of Forestry and Range Resources, while a permit to hunt birds can be bought from the Department of Wildlife and National Parks. However, violation of permits' prescriptions is plausible, e.g., exceeding quota limits, harvesting out of season and wrong harvesting techniques. The proposed water infrastructure project could increase illegal procurement of natural resources through an increase in the number of people (i.e., construction teams) in the area. Specifically, the construction teams represent a potential additional market with relatively higher purchasing power for illegally procured biodiversity and could also bring with first-hand illegal procurers (poachers).

Suggested Mitigation Measures

1. Conduct training workshops/seminar for all construction staff on the dangers and possible consequences of illegal use of biodiversity, i.e., effect on biological species conservation, penalties, and fines.
2. Increase monitoring and surveillance for poaching through regular visits by the Department of Wildlife and National Parks and other security agencies. Where possible, even consider embedding DWNP staff into construction camps as a preventative strategy.
3. Report all incidents of poaching or illegal acquisition of biodiversity to the Department of Wildlife and National Parks, Department of Forestry and Range Resources or Botswana Police Service.
4. Develop and implement a poaching surveillance and monitoring system.

9.8.3 Change in wildlife behaviour, wildlife mortality and Human wildlife conflict - Operation

Trenches excavated during decommissioning can cause direct wildlife mortality because of pitfalls. In addition, the sudden withdrawal of water at decommissioning could trigger mortality of wildlife habituated to accessing water from pipeline leakages. Considering the high anthropogenic activity in some parts of the project area, the sudden withdrawal of water at decommissioning could facilitate negative human wildlife interaction as wildlife roam around in search of water. However, decommissioning of the Sowa Water Supply Scheme is expected to be comparatively short term and similarly the significance of the impact.

Suggested Mitigation Measures

1. Development of a comprehensive water leaks' monitoring and detection system for early warning, i.e. routine patrols of the water pipeline.
2. Maintain and repair, at the earliest opportunity, all water leaks from the water infrastructure.
3. Monitor spatial-temporal distribution of wildlife populations along the water infrastructure.

4. Monitor patterns and trends of wildlife mortality due to vehicle collision along the pipeline route.

9.8.4 Elevated Risk of Increased Incidents of Negative Human-Wildlife Interactions – Pre-Construction, Construction, Operation and Decommissioning

Construction of a major project like the proposed water infrastructure development is likely to come with a construction camp for staff. However, inappropriate management (handling, onsite storage and disposal) of waste is often an issue at construction camps. Wastewater and waste food can attract various wildlife species to the construction camp. Where such alternative food sources are continuous, it ultimately leads to habituation of wildlife to construction camps. Some avian species known to occur in the area are also known to easily habituate to camps, e.g., all hornbills, Ploceidae species and crows. In addition, some mammalian species known to occur in the area are also known to readily habituate to construction camps. When construction or decommissioning activity ceases, the sudden withdrawal of the resources could have consequences on survival of the habituated individuals. In addition, the closer interaction between wildlife and people due to habituation will promote the likelihood of human wildlife conflict. Often, management of problem animals involve lethal removal of the concerned wildlife, and hence increased wildlife mortality.

HAC is expected to occur throughout all phases of the proposed water infrastructure development. HAC mediated by waste food and water is expected to be most prevalent during the construction and decommissioning phases due to presence of construction camps. Water leaks mediated HAC due to defective structures is exclusively related to the long-term operational phase, and this will primarily concern problem with elephants.

Suggested Mitigation Measures

1. Proper management (designate site for waste storage, onsite handling, storage and disposal) waste food and water. Waste food should be treated on site (e.g., drying) and accumulated on site in aerated enclosures not accessible to wildlife. Covered ground pits can be an option for disposal of organic food waste and such pits should be routinely backfilled with soil to stop wildlife accessing the waste.
2. Conduct staff training workshops/seminars on HAC – management, causes, preventative strategies, consequence on human and wildlife, response procedures and others.
3. Routine maintenance and repair of leakages as soon as they occur.
4. Display warnings sign to constantly remind construction crews of the dangers of wildlife, e.g., “Wild Animals are Dangerous do not feed or Approach too Close”.
5. Develop and implement HAC and wildlife habituation monitoring system.
6. Report all incident of HAC to the nearest Department of Wildlife and National Parks office or Police Station.

9.8.5 Wildlife Habituation and Modification of Behaviour – Construction and Decommissioning

Water and moisture gradient are the primary drivers of semi-arid African savanna environments like Botswana. It regulates availability of surface water and consequently determines spatial distribution and space use behaviour of water dependent species. Large quantity leakages are a common sight on water pipelines in Botswana. These leaks create small ponds that attract livestock and wildlife. Examples of pipeline leakages observed across Botswana include the Mokoboxane- Orapa pipeline and one between Serinane and Molepolole (**Figure 27**). Elsewhere, most domestic stock (i.e., kgomo cattle *Bos indicus*, tonki donkey *Equus ursinus*, pudi goat *Capra hircus* and nku sheep *Ovis aries*) were observed drinking water leaking from pipelines, i.e., **Figure 27**). It is highly likely that at night when

disturbance is low, the African elephant and some extant wildlife species (i.e., small mammals e.g., kudu, steenbok and duiker and the highly adaptable jackal) will use these puddles. Overtime, ranging behaviour of water dependent species could change because of perennial availability of water from pipeline leakages. In this regard, the proposed water infrastructure introduces a risk of changes in wildlife behaviour in response to pipeline-mediated availability of water. Frequent visit to the pipeline ponds also introduces the risk of ambush poaching at the water source. Considering the high affinity of the pipeline to existing roads, leakages and ponding will also increase the likelihood of wildlife mortality from vehicle collisions.



Figure 27: An example of ponding around a pressure release value on a water pipeline between Serinane and Molepolole [SOURCE: Gosiame Neo-Mahupeleng]

Suggested Mitigation Measures

1. Proper management (designate site for waste storage, onsite handling, storage and disposal) waste food and water. Waste food should be treated on site (e.g., drying) and accumulated on site in aerated enclosures not accessible to wildlife. Covered ground pits can be an option for disposal of organic food waste and such pits should be routinely backfilled with soil to stop wildlife accessing the waste.
2. Conduct staff training workshops/seminars on HAC – management, causes, preventative strategies, consequence on human and wildlife, response procedures and others.
3. Routine maintenance and repair of leakages as soon as they occur.
4. Display warnings sign to constantly remind construction crews of the dangers of wildlife, e.g., “Wild Animals are Dangerous do not feed or Approach too Close”.
5. Develop and implement HAC and wildlife habituation monitoring system.
6. Report all incident of HAC to the nearest Department of Wildlife and National Parks office or Police Station.

9.8.6 Increased Risk of Wildlife Mortality due to Pitfalls – Construction and Decommissioning

Construction of water pipelines entails digging of a narrow deep trench with repeated concrete chambers at specific intervals to regulate flow and install pressure release valves. Similarly, during

decommissioning, open trenches will be dug to remove the buried pipeline, hence creating the same open trench that poses a risk of pitfalls. Open trenches pose a risk of pitfalls by wildlife, and even livestock. Pitfalls can lead to injury or death. This risk is compounded further by the often-narrow width of the water pipeline trenches that can hinder escape of most animals from the trench. Most mammalian species recorded by the rapid ecological field surveys can be affected by pitfalls, particularly medium to large mammalian species. Other taxonomic groups (reptilian and amphibian) can also be affected by pitfalls. The risk of pitfalls is expected to be most pronounced where the pipeline routes are very close to areas associated with higher wildlife densities; north of Nata to Sepako, at intersection or closer to hydrological features and around the salt pans.

Suggested Mitigation Measures

1. Keep to the minimum possible the length of trench left open overnight.
2. No open trenches should be left over night near hydrological features (<250 m); rivers and pans, including pre-existing pipe leakages.
3. Mark all open trenches with luminous red-white tape to make open trenches more visible to approaching wildlife.
4. Report all incidents of wildlife pitfalls to the nearest DWNP Office or Botswana Police.

9.8.7 Increased Incidents of Veldt Fires - Pre-Construction, Construction and Decommissioning

Wildfires are significant biodiversity conservation and socio-economic concern. Fires can degrade the quality of habitat, cause wildlife mortality, regulate short to medium term spatial-temporal redistribution wildlife, and does destroy some veldt products (e.g., thatch grass, wild fruits and fuel wood) that some local livelihoods are dependent upon. In addition, fires can also affect the quality of the water infrastructure installations and consequently the delivery of water in the project area.

Like poaching, an influx of construction teams brings with it increased risk of wildfires, i.e., more domestic fires (cooking, smoking and other sources) at the Contractor and labourer's camps specifically, welding activities at manholes etc. Hence increased risk of escape into the wild. As fire risk is directly related to number of people, this risk of increase in veldt fires is expected to be most pronounced during the construction and decommissioning phase because of an influx of construction and decommissioning teams respectively.

Suggested Mitigation Measures

1. Implement fire control measures which include fire beaters.
2. Conduct staff training workshops on basic fire management and response procedures, and fire suppression.
3. Develop internal fire reporting, response procedures and fire response plan which includes neighbours.
4. Report all incidents of fires to the nearest Department of Forestry and Range Resources office or any Botswana Police Service station.
5. Monitor fires occurring along the water infrastructure route, frequency, intensity, direction and possible expansion.

9.8.8 Pollution of the Natural Environment – Construction, Operation and Decommissioning

Waste material affects the aesthetic appeal of the landscape and can directly cause wildlife mortality and injuries. For examples, injury or mortality due to entanglement in waste wire strings and possible ingestion of toxic waste materials. Also, food and sewage waste as mentioned earlier have implications on wildlife habituation, changes in wildlife behaviour and consequently human animal conflict. Pollution of the natural environment is expected to be almost exclusive to the construction and decommissioning phases only when there are high material inputs and dismantling respectively, and the presence of construction crews. Types of expected pollutants include metal, construction rubble from concrete foundations, packaging materials, food, sewage, and solid waste from construction camps.

Suggested Mitigation Measures

1. Develop waste management systems that defines and prescribes means of collection, temporary storage, transport, and disposal of the various waste material generated from construction, operation and decommissioning of the proposed water infrastructure. The system should also detail waste that can be recycled and reused and encourage these practices.
2. Sort and where possible manage waste according to best-practice and World Bank General EHS Guidelines and industry-specific EHS Guidelines for Water and Sanitation projects on site (e.g. drying and burning or burying of organic and waste food). Reuse and/or recycle waste material as much as possible e.g. some of the waste pipes can be sold to local farmers.
3. Dispose of all waste material at nearest designated sites (i.e. approved by DWMPC); i.e. landfills, sewage ponds.
4. Where applicable pay of local council levies and rates or private waste management companies for collection of waste material and appropriate disposal at designated sites.
5. Develop and implement a waste monitoring system (quantity generated per waste type, temporary storage, transportation, proof of disposal etc.).

9.9 Waste management

9.9.1 Improper Waste Handling and Disposal – Pre-Construction, Construction, Operation and Decommissioning

Waste will be generated at all phases of the project and that includes all working sites, Labourer's camps and construction camps. The waste that will be generated during pre-construction and construction is; domestic waste, hazardous waste, liquid waste and construction waste (e.g. rubble, empty oil cans, metal pieces etc). Operation of the scheme will require maintenance of the scheme which will generate most waste forms such as cut-offs, replaced waste parts and pipes.

The decommissioning phase will generate some waste in different forms as well which will include demolished material and equipment and general domestic waste from the workers and liquid waste as well. Any improper handling and disposal of waste may pose a risk to both public health and animals more especially to the livestock from the cattle posts, ranches and wildlife.

Suggested Mitigation Measures

- A centralised waste storage area needs to be set up as a temporary facility. It needs to have restricted access (e.g., fencing, and locked gate) and have adequate lighting.

- Only the designated dumping site per village sub-project should be used for solid waste disposal. These centralised areas should be access restricted, demarcated, and organised in such a way that waste types can be sorted, and the different types stored safely (on a temporary basis) before transport and disposal. Wastewater from all toilets will be collected by a reputable and certified waste handler (certified by the DWMPC) and transported to a certified wastewater treatment facility in Sowa Town.
- Bunded walls with appropriate cover and ventilation should be constructed at the contractor's camp, labourer's camp, and construction sites for temporary containment of liquid wastes before disposal.
- Liquid waste (used oils, diesel, and other hydrocarbons) from the contractor's camp, Labourer's camp and construction sites should be collected by a reputable waste handler who is licensed by the DWMPC, and it should be transported to a certified handling facility.
- A record (including waste manifests, waste quantities) of all waste collection, disposal methods and destination of waste should be kept on site
- Trucks hauling waste must be covered and adhere to the Contractor's Traffic Management Plan (TMP).
- Waste receptacles with animal proof lids must be provided at all the working sites, labourer's Camp, and the contractor camp site.
- Waste recycling objectives should be established, workers should be provided with training to meet the objectives and waste receptacles should be colour coded and properly labelled to encourage waste recycling.
- Provide portable toilets onsite for both males and females during construction phase.

9.10 The Phase of Project Implementation: Operation

9.10.1 Improved Livelihoods Due to Water Availability

After the sub-project is completed, and the community water daily demand is likely to be supplied by the connected boreholes. This means the water will be adequate, and there will be no more waiting in long lines for water collection. This will free time for people to engage in other livelihood activities.

Suggested Mitigation Measures

- Maintain public standpipes and the related infrastructure.
- Mobilise community members to reticulate water to their plots to reduce pressure on the use of the public standpipes.
- Raise public awareness on wise water usage and taking care of the water infrastructure.
- Sensitise school children on water management.
- Community leadership and S&CD Office to request WUC to come with a programme that allows people to pay for water connection in instalments and the connection only done once they have paid off the fee.
- Find out if it is possible to install the prepaid water taps to the households to avoid people not being able to pay bills and their water supplies being disconnected, and then being faced with the payment for reconnection and the outstanding bills.

9.10.2 Groundwater Over-mining (Depletion)

Groundwater in Botswana present an essential source of drinking and irrigation water especially in rural areas. There is therefore a potential of over-mining the wellfield especially since the country is prone to droughts and low rainfall. The most severe consequence of excessive groundwater pumping

is that the water table, due to the proximity of all sub-project BHs including the private ones, over pumping might lead to depletion of groundwater resources in the wellfield leading to the following:

- Lowering of the water table
- Reduction of water in surface water bodies in the area
- Land subsidence
- Increased costs for the users especially private boreholes
- Deterioration of water quality

Suggested Mitigation Measures

- Avoid groundwater resources pollution from the surrounding area.
- Find long-term alternative water sources for sub-project villages that can be used to help replenish aquifers. Deriving water from other sources would also give aquifers time to refill instead of pumping too much water from them at once.
- Monitor groundwater usage by WUC in the area and activities that can contribute to the water resource pollution.
- Optimise the pumping rates and frequency of project boreholes by WUC to avoid over pumping.

9.10.3 Water Supply Disruptions Due to Vandalism/Theft of Infrastructure

Vandalism and theft of infrastructure by some members of the community is a major concern in the project area. Vandalism mostly occurs at air valve chambers, and this is usually done to provide water for livestock. Stealing of air valves along pipelines is also common in the project area. Prolonged water leakages around the pipelines eventually attracts wildlife especially elephants which dig pipes out and resulting in vandalism. A combination of the above vandalism results in heavy water losses and compromise water supply in the project area.

Suggested Mitigation Measures

- Raise community awareness on pipe vandalism and its consequences such as water shortage and the associated reduction in water pressure. This should be done by WUC through the village leadership.
- Provide lockable covers and locks for all the manholes and valve chambers.
- Monitor telemetry and SCADA to identify pipe leaks and urgently respond to the leakages to minimise the subsequent pipe vandalism by wildlife especially elephants.
- Provide an electric perimeter fence and provide metal spikes embedded on a perimeter concrete apron to deter elephants.

9.10.4 Potential Risk of Groundwater Pollution from Discharges of Brine Effluent (with high salt concentration) due to Leakages from the Evaporation Ponds or Feeder Pipes.

Brine effluent will be generated from the reverse osmosis process. This effluent will have high salt concentration, and discharge to the environment could have impacts on groundwater. The effluent is not hazardous. Evaporation ponds are included in the design to manage the effluent. The climate of Botswana facilitates evaporation, and the salt will be deposited for management as a solid waste. There are risks of leakage of brine from the ponds if the liners are damaged during clearing of salt, or

from extreme rainfall or flood events. There is also risk of leakage of brine if there is damage to the feeder pipes.

Suggested Mitigation Measures

The evaporation ponds themselves are included in the design of the sub-project and are the main mitigation intervention in terms of control of brine discharge, but there are several related measures that are important, including:

- Train and supervise workers that clear the dried salt from ponds, using plastic brushes and plastic shovels to reduce potential damage to the liner.
- Implement a robust monitoring schedule to identify potential leakages from ponds and pipes. Linked to this, the monitoring data on evaporation rates will provide a useful baseline for identifying ponds that might have leaks, because water levels in the ponds would be dropping quicker than expected.
- Include a controlled overflow channel in the design of the evaporation ponds, for better management of impacts of extreme rainfall events and floods.

9.10.5 Potential Risk of Groundwater and Environmental Pollution from Sludge and Backwash from the Pre-treatment

The pre-treatment stages of the new plant will include flocculation and filtration to remove solids. Low quantities of sludge and wastewater from the flocculation and from washing of the filtration tanks will be generated. These will not be hazardous, but will contain salts and some traces of chemicals used in water treatment. These chemicals are widely used in water treatment and would not be hazardous at the planned dilution levels. An option for this sludge and effluent is to be discharged in the existing oxidation ponds, but the preferred option would be discharge into the evaporation ponds. The sludge will be diluted and pass by pipeline into the ponds. As with the brine effluent, there will be potential risks of pollution on groundwater and the environment from the sludge and backwash through leakage of these effluents from pipes if they become blocked or damaged.

Suggested Mitigation Measures

- Dilute the sludge to reduce the risk of blockage to pipes.
- Train and supervise workers so that pipes do not become blocked from incorrect disposal of other objects into the system.
- Implement a robust monitoring schedule to identify potential leakages from pipes and carry out repairs at an early stage.

9.10.6 Potential Drowning of Animals Accessing the Evaporation Ponds Area

There is a potential risk to biodiversity during operation of the desalination plant (RO plant) in terms of potential access of birds and mammals to drink from the evaporation ponds hence posing a risk of drowning. The salty water might have an impact on the health of the animals and birds. However, such species quickly identify with salty water and avoid the water if it is not suitable for drinking. The water would be salty but with no hazardous chemicals.

Suggested Mitigation Measures

- Fence the site, mainly with the intention of preventing people from entering the site, but this will also prevent mammals entering the site. Birds in particular tend to be able to identify salty water and will not be impacted. WUC will include recording bird species, when observed at the site during operation.

10. ENVIRONMENTAL AND SOCIAL MANAGEMENT PLAN

10.1 Environmental and Social Management Structure

10.1.1 Water Utilities Corporation

This chapter represents the measures and actions required for the project to achieve compliance with the ESMP considering the findings of the environmental and social assessment, World Bank's due diligence and alignment with its policies and principles, the laws and regulations of Botswana, and the results of the engagement with stakeholders, interested parties and project affected people.

10.1.2 Mitigation Plan

The mitigation plan presents a programme for the management of mitigation measures. It answers the questions on what impact is to be mitigated, the mitigation measure to be implemented, and resources required for implementing the measures and assigning responsibility on who undertakes the mitigation measures. This is presented in **Table 70**.

10.2 Environmental and Social Inspection and Reporting

The Contractor shall appoint an environmental officer registered with Botswana Environmental Assessment Practitioner's Board (EAPB) and a qualified Social Expert to oversee the proper implementation of all social and environmental mitigation and enhancement measures recommended in this report. The Contractor's environmental officer will prepare a Contractor's ESMP (C-ESMP) and compile a monthly report detailing environmental and social performance for the period. It will include past performance, audit reports and monitoring data, planned action for mitigating anticipated risks and how recommendations made by WUC's project environmental and social officers are being implemented. The Codes of Conduct, GM, C-ESMP and related safeguards will also be included in the bid documents as requirements for procuring the Contractor.

10.3 Roles and Responsibilities

1. WUC

The overall responsibility for implementing the ESMP lies with WUC's Project Implementation Unit (PIU). PIU will need to monitor the implementation of the mitigation measures and has;

- Established an Environment and Social Unit responsible for ensuring timely implementation of the plan, including monitoring, reporting, and capacity building related to safeguards; the unit comprises Environmental, Social and GBV expert.
- The PIU also has a complement of various disciplines of engineering who will ensure the technical aspects of the ESMP are implemented accordingly
- PIU also has project management office which manages controls aspects of the project
- Will Assign the Construction Supervision Consultants, both safeguards and engineering to also be responsible for supervision of the contractor's safeguard performance as part of the construction contract and include this requirement into the terms of reference.

PIU will also have departments under various ministries who will also support the implementation of the ESMP.

2. Environmental Specialist (Project Liaison Officer)

Enviro Solve Consultancy (Pty) Ltd has been appointed as the environmental consultant to be called the Project Liaison Officer (PLO) tasked to monitor the project. He/she will carry out daily site inspections and to verify compliance with ESMP requirements. Feedback to the client would be in the form of monthly progress reports and feedback. Urgent or pressing issues will be brought to the attention of WUC's PIU immediately. The PLO will oversee the implementation of project activities in accordance with the mitigation implementation programme, ensure that the code of conduct is adhered to, sign off to indicate the satisfactory implementation of mitigation measures, and impose the necessary sanctions, if activities are not carried out in accordance with the ESMP. The PLO will ensure that the contractor follows through on the specified mitigation measures and implement them to the proponent's satisfaction in the specified timeframe.

The key responsibilities of the PLOs are to:

- Monitor the contractor's implementation of the ESMP/C-ESMP via daily inspections of the contractor's camps and works sites.
- Organize periodic stakeholder's meetings to ascertain the effectiveness of mitigation measures.
- Prepare and submit monthly Environmental and Social Reports summarizing the contractor's activities (such as training programmes, community meetings, etc.) and compliance with the ESMP and C-ESMP to WUC and the DEA in compliance with Section 18 of the EA Act, 2011.

If the PLOs identify any ESMP/C-ESMP non-compliance issues by the contractor, a non-compliance notice will be issued to the contractor through the Engineer to act. This will be included in the report to the WUC and on urgent issues, will be reported immediately. All documentation and communications to the Contractor will be kept and preserved in accordance with good record keeping practices as this will be essential in the event of disputes and for project completion reviews. The contractor will be required to prepare a corrective action plan to be implemented by a date agreed with the Engineer. Non-compliance will be ranked according to the following criteria:

- Non-Compliance Level I: A situation that is not consistent with requirements of the ESMP/C-ESMP, but not believed to present an immediate or severe social or environmental risk. Repeated Level I concerns may become Level II concerns if left unattended.
- Non-Compliance Level II: A situation that has not yet resulted in clearly identified damage or irreversible impact, but which demonstrates potential significance. Level II requires expeditious corrective action and site-specific attention to prevent severe effects. Repeated Level II concerns may become Level III concerns if left unattended.
- Non-Compliance Level III: A critical situation that will result in significant social or environmental damage occurring or a reasonable expectation of very severe impending damage. Intentional disregard of Non-Compliance Notices or specific prohibitions is also classified as a Level III concern.

3. The Contractor

The Contractor will be responsible for the day-to-day implementation of the project activities. To effectively implement this, the Contractor shall appoint an Environmental Officer (EO), Social Officer and a Community Liaison Officer (CLO). The Contractor must ensure that the supervisors including other workers of the project are well informed of the contents of the ESMP so that these are cascaded to the rest of the workforce on the sub-project. The Contractor will report any difficulties in implementing the mitigation measures to the PLO and ensure that all instructions which are given by the client in pursuance of the same are carried out:

- The Contractor is expected to prepare and submit to the WUC, a C-ESMP which includes COVID-19 mitigation measures and management strategies.
- The document would provide a detailed explanation of how the Contractor will comply with the project’s ESMP and demonstrate that sufficient funds are budgeted for that purpose.
- The C-ESMP should include COVID-19 mitigation measures and management strategies and other specific mitigation and enhancement measures based on the ESMP, the final design and the site selected for the Contractor’s camp. The plan should have Management Strategy and Implementation Plans (MSIPs) for the following and guidelines for details required are presented in **Annexures 4, 5, 6, 7, 8, 9, 10, 12, 13 and 15.**
 - Work Activities Plan
 - Emergency Preparedness Plan
 - Traffic Management Plan (TMP)
 - Occupational Health and Safety Strategy (the strategy to include COVID-19 protocols)
 - Community Health and Safety Management Strategy (the strategy to include COVID-19 protocols)
 - Waste Management Plan (WMP) at the Contractor’s camp
 - Labour Management Plan
 - Vibration (Blasting) Plan.

Codes of Conduct to address GBV/VAC including training and awareness on community relations and norms for its workers as well as codes of conduct for handling of grievances, reporting and handling of GBV/VAC cases.

The Contractor is to prepare and submit a monthly report on the implementation/compliance on the environment and social mitigation measures, including compliance with the codes of conduct.

4. The World Bank

The World Bank provides technical support to ensure compliance with the provisions of the ESMP and World Bank safeguards policies together with WBG EHS Guidelines and will assist with technical capacity building.

5. Other Supporting National and Local Institutions

In addition to WUC, the PLOs, and the Contractor, further checks and balances will be provided by relevant institutions. These are shown in **Table 70** below. These institutions will have an oversight role to ensure environmental and social safeguards are complied with in the implementation of the ESMP as listed in the Monitoring Plan. They are to be formally introduced to the sub-project by WUC before and during implementation. They will be invited to attend monthly site progress meetings and shall be trained to increase their capacity for oversight monitoring.

Table 70: Supporting National and Local Institutions in ESMP Implementation

Institution	Mandated Role	Role/Activities to Play in ESMP Implementation
Ministry of Land Management, Water and Sanitation Services	Policy and funding for land, water, and sanitation	- Funding and policy direction
Tutume and Nata Sub-Land Boards	Management of Tribal Land	- Permit/ give surface rights for contractor’s camps, labourer’s Camp, reservoir tank and pump stations

Institution	Mandated Role	Role/Activities to Play in ESMP Implementation
		- If any resettlement issues arise, assist in evaluating land parcels.
Ministry of Nationality, Immigration and Gender Affairs	Policy and responsible for Gender Affairs, and Immigration issues	- Creation of a gender sensitive environment - Promotion of gender equality - Coordination and facilitating capacity building in various aspects of gender and development. - Promotion of the development of gender sensitive sectoral policies and procedures.
Department of Environmental Affairs	Responsible for Environmental and Social Impact Assessment (ESIA) preparation and protection of the environment	- Receive monthly reports and audit the project.
Sowa Town and Tutume Sub-District Councils	Seeks development of the district	- Provides oversight monitoring of environmental, social safeguards measures and overall project delivery. - Through S&CD will monitor those beneficiaries including the vulnerable people are employed.
Department of Occupational Health and Safety	Ensures the safety and welfare of workers at the factories	- Inspect sites for safety of workers and compliance with the Factories Act.
Department of Waste Management and Pollution Control	Policy making and in charge of waste management in the country	- Inspect sites for waste management (land pollution, soil contamination etc.).
Department of National Museum and Monuments	Responsible for archaeology in the country (cultural and historically sites and artefacts)	- Will respond to Chance Finds and give guidance.
Botswana Police Services	Protection and prevention of crime and civil cases.	- Maintain peace at the work sites and provide advice on crime prevention and affrays; will address crime.
Department of Labour and Home Affairs	Labour issues	- Provide safety awareness/education materials for workers. - Inspect sites periodically
Department of Road Transport and Safety	Promotes road and machinery use in a safely manner	- Ensure that the machinery to be used by the contractor is safe to use.
Department of Radiation Protection and Inspectorate	Permits use of radiation equipment and monitors the exposure	- Permit use of laboratory equipment at the waterworks site.
District Medical Health Teams (Medical Facilities)	Provide health education and medical services	- Provide health awareness/ education materials and provide medical services to ill/sick workers.
Village Development Committees and Tribal Administration	Settlement development and local/ community governance	- Choose representatives for GM. - Monitor implementation of Safeguard measures.
Department of Gender Affairs	Promotes gender equity and the coordination and facilitation in various	- Educate and create awareness on social issues such as GBV and revitalization of aspects of San women and their rights.

Institution	Mandated Role	Role/Activities to Play in ESMP Implementation
	aspects of gender policy development.	- Be part of the GM Committee.

Table 71: Mitigation Plan

Project Activity	Phase	Potential Impacts	Proposed Mitigation Measures	Institutional Responsibility	Estimated Costs (Pula BWP)
WASTE MANAGEMENT					
All construction activities (pipe laying, storage and pump stations construction)	Pre-Construction, Construction, Decommissioning and Operation	Improper waste handling and disposal	<ul style="list-style-type: none"> • Set up a centralised waste storage area as a temporary facility. It needs to have restricted access (e.g., fencing, and locked gate) and have adequate lighting. • Only the designated dumping site per village sub-project should be used for solid waste disposal. These centralised areas should be access restricted, demarcated, and organised in such a way that waste types can be sorted, and the different types stored safely (on a temporary basis) before transport and disposal. Wastewater from all toilets will be collected by a reputable and certified waste handler (certified by the DWMPC) and transported to a certified Wastewater treatment facility in Sowa Town. • Construct bunded walls with appropriate cover and ventilation at the contractor’s camp, labourer’s camp, and construction sites for temporary containment of liquid wastes before disposal. • Arrange that liquid waste (used oils, diesel, and other hydrocarbons) from the contractor’s camp, labourer’s camp and construction sites be collected by a reputable waste handler who is licensed by the DWMPC, and it should be transported to a certified handling facility. • Keep a record (including waste manifests, waste quantities) of all waste collection, disposal methods and final destination of waste on site 	<p>SHE Officer</p> <p>Environmental Officer</p> <p>Social Officer</p> <p>Resident engineer</p>	250, 000.00

Project Activity	Phase	Potential Impacts	Proposed Mitigation Measures	Institutional Responsibility	Estimated Costs (Pula BWP)
			<ul style="list-style-type: none"> • Ensure that trucks hauling waste are covered and that they adhere to the Contractor's Traffic Management Plan (TMP). • Provide waste receptacles with animal proof lids at all the working sites, labourer's camp and the contractor camp site. • Establish waste recycling objectives and train workers to meet the objectives and waste receptacles should be colour coded and properly labelled to encourage waste recycling. • Provide portable toilets onsite for both males and females during construction phase. 		
SOCIAL MANAGEMENT					
Trenching for pipe laying	Construction	Disruption of public routes or access	<ul style="list-style-type: none"> • Restore, to the extent possible, any public infrastructure or amenities that are disrupted to enable continued access. • Construct pedestrian crossing points at 2 km intervals along trenches. • Provide temporary crossing over the excavated trenches to facilitate ease of access. Red danger tape should be placed along the trenches, and it should be visible to residents and motorists. • Backfill all open trenches as soon as possible to avoid injuries to people, livestock and wildlife in the project area. • Mark off all open trenches with danger warning tapes to warn pedestrians of the potential hazard. • Cordone excavated areas with reflective danger warning signage and cover trenches within 12 hours. 	Contractor SHE Officer Environmental Officer Social Officer	250,000.00

Project Activity	Phase	Potential Impacts	Proposed Mitigation Measures	Institutional Responsibility	Estimated Costs (Pula BWP)
			<ul style="list-style-type: none"> • Provide an avenue for complaints by the public (i.e., GM) and make the public aware of this mechanism. 		
Blasting	Construction	Damage to property due to vibrations caused by blasting	<ul style="list-style-type: none"> • Baseline seismography monitoring should be undertaken at an early stage since blasting may induce seismic activity underground. • Ensure requirements for human health and safety relating to blasting are adhered to avoid unnecessary damage to infrastructure. • The developer should monitor blasting extensively and report the outcomes to regulators and analysing results to help minimise impacts. • Using noise control devices, such as temporary noise barriers and deflectors for impact and blasting activities. • Noise control devices, such as temporary noise barriers and deflectors for impact and blasting activities should be used. • Workers should be provided with protective clothing and equipment • Explosives or blasting agents shall not be abandoned • Properly handle explosives according to current procedures. • Prevent unauthorized persons from entering the blast site. • Ensure proper placement of barricades and appropriate signage around the blast site. • Before laying out any blasting supplies, the blast site shall be barricaded and posted with explosive signs to prevent unauthorized entry. 	Contractor Project Manager Environmental Officer Social Officer	100,000.00

Project Activity	Phase	Potential Impacts	Proposed Mitigation Measures	Institutional Responsibility	Estimated Costs (Pula BWP)
Recruitment and job seeking	Construction, Operation and Decommissioning	Provision of unskilled, semi-skilled and skilled employment	<ul style="list-style-type: none"> Notify the community of job opportunities prior to start up and sensitise them regarding the types and number of labourers needed and skills required. Implement a recruitment process to adhere to labour procedures and policies. (Employment Act CAP 47:01 Item (1). The Act advocates for equal opportunities for qualifying applicants, irrespective of gender, tribe, religion, or political beliefs.) Advertise employment opportunities via village kgotlas. Develop a recruitment strategy that takes into consideration locally available skills. Implement labour intensive rather than capital intensive work methods wherever possible. Educate and train employees to enable skills transfer. 	Contractor Project Manager Environmental Officer Social Officer	100,000.00
Procurement of Goods and services Influx of people working for the contractor Hawkers selling goods and cooking for contractors	Construction	Enhanced socio-economic development (livelihoods improvement)	<ul style="list-style-type: none"> Uphold measures geared towards citizen empowerment and skills transfer Embark on projects social responsibility to uplift livelihoods Optimise and upgrade water transmission infrastructure for reticulation efficiency. Encourage the procurement of goods and services from local service providers, disadvantaged individuals, and women. 	Contractor Environmental Officer Social Officer	160,000.00
Recruitment (Influx of people)	Construction	Erosion of societal norms & values and Gender Based Violence (GBV)	<ul style="list-style-type: none"> Raise awareness amongst the local communities on social ills and their implications. 	Contractor - Project Manager	100,000.00

Project Activity	Phase	Potential Impacts	Proposed Mitigation Measures	Institutional Responsibility	Estimated Costs (Pula BWP)
			<ul style="list-style-type: none"> • Maximise the hiring of local labour by the contractor. • Sensitise the construction workers on community values and norms. • Participate in local crime prevention activities. • Liaise closely with the police and other crime law enforcement authorities to address crime and social problems. 	Environmental Officer Social Officer	
HEALTH AND SAFETY					
All Construction activities	Pre-Construction, Construction, Decommissioning and Operation	Potential accidents and injuries (Occupational Health)	<ul style="list-style-type: none"> • Provide workers who have access to the site with standard overall, safety boots and hard hats to be allowed access to the construction site. It should be the mandated standard PPE for every worker and its use should be monitored. • Implement a confined space entry program that is consistent with applicable national requirements. • Use fall protection equipment when working at heights • Maintain work areas to minimise slipping and tripping hazards • Use proper techniques for trenching shoring. • Implement fire prevention measures in accordance with internationally accepted standards • Implement prudent handling and storage of hazardous chemicals shall be enforced. • Provide various PPE for different hazardous work environment such as dust masks, gloves, safety goggles, ear plugs, safety harness etc. 	Contractor SHE Officer Environmental Officer	500,000.00

Project Activity	Phase	Potential Impacts	Proposed Mitigation Measures	Institutional Responsibility	Estimated Costs (Pula BWP)
			<ul style="list-style-type: none"> • Provide workers with appropriate training on safety measures on site and ensure that these are implemented. • Ensure that a worker proficient and certified in first aid is always available on site. • Make a fully equipped first aid kit available in all the construction vehicles and at the site office, as well as the labourer's camps. • Provide workers should be provided with protective clothing such as boots and gloves. 		
During any Construction activity	Construction	Risks due to unplanned emergencies	<ul style="list-style-type: none"> • Develop an Emergency Preparedness Plan to address preventing and mitigating the environmental impact that is associated with emergency events. • Review emergency preparedness procedures and test their effectiveness periodically, as well as whenever an incident occurs. • Actively assess operational risks for individual sites to ensure that emergency response procedures prepare the sites to effectively respond to emergency situations. The assessment process should test planned responses and evaluate how effectively they deal with the consequences of an unplanned event. • Develop a properly trained emergency response team staffed by operating personnel and led by a trained emergency response coordinator drawn from management-level personnel. • Identify proper emergency equipment and develop a program for practice drills to ensure 	Contractor management team Contractor's Engineer Contractor's SHE Officer Contractor's Community Liaison Officer Environmental Officer	50,000.00

Project Activity	Phase	Potential Impacts	Proposed Mitigation Measures	Institutional Responsibility	Estimated Costs (Pula BWP)
			response measures are effective and understood.		
Excavations for trenching	Construction	Potential trench collapse (cave-ins)	<ul style="list-style-type: none"> • Employ a competent person to inspect trenching daily. • Train workers on working safely in/ around trenches and early detection of potential trench collapse. • Keep heavy equipment/ activities away from trench edges. • Identify locations of underground utilities. • Provide safe access and ingress to all excavations. This should be ladders and steps ramps at 2km intervals and where necessary within the villages to access. • Ensure that stockpiles of excavated materials be put at minimum safe distance of 1 m from the edge of the trench. • Protect workers and trenches by use of proper techniques for shoring or shielding. • Prevent community members (especially children) and animals from entering the construction area with open trenches. • Minimise the length of open trenches at any one period and backfill trenches as soon as possible. 	Contractor SHE Officer Environmental Officer	100,000.00
Haulage of construction materials and equipment	Pre-Construction, Construction and Decommissioning	Increased traffic and road traffic related accidents	<ul style="list-style-type: none"> • Ensure that traffic routes avoid villages and other habited places as far as possible. • Demarcate routes and ensure that all construction traffic made to use the designated routes, including visitors to the sites. 	Contractor SHE Officer	85,000.00

Project Activity	Phase	Potential Impacts	Proposed Mitigation Measures	Institutional Responsibility	Estimated Costs (Pula BWP)
			<ul style="list-style-type: none"> • Designate speed limits, especially within villages and high-risk areas. Recommended limits are 80 km/hr within the highways, 60km/hr on dirt roads, 30 km/hr around the work sites and 40 km/hr within the village. • Fit construction vehicles with hazard lights and reverse sirens and check for road worthiness. • Employ flagmen to direct and manage traffic in congested/dangerous traffic situations. • Ensure that truck drivers have the necessary certificates/licenses to drive the trucks. • Monitor behaviour of road users (Contractor, sub-contractors, suppliers and visitors) should be monitored and offences penalised. • Ensure deliveries to be made during low traffic peak hours and traffic routes should avoid villages and other habited places as far as possible. • Demarcate strategic routes and ensure that construction traffic use the designated routes including visitors to the sites • Place traffic warning signs strategically at road turn offs to warn oncoming traffic. • Brief truck drivers on road traffic rules and regulations. • Ensure that trucks transporting large equipment or hazardous waste are clearly marked. • Night driving should not be permitted. 		

Project Activity	Phase	Potential Impacts	Proposed Mitigation Measures	Institutional Responsibility	Estimated Costs (Pula BWP)
Loading, Haulage & dumping	Pre-Construction, Construction, Operation and Decommissioning	Noise pollution	<ul style="list-style-type: none"> • Provide employees with full PPE including ear plugs and masks. • Reserve PPE for visitors to the sites. • Ensure that visitors are given induction training before they are allowed entry into the sites. This training shall include key health, safety and environmental risks, potential impacts and mitigation measures as covered by the ESMP. • Conduct toolbox talks for workers to raise awareness about the impacts of noise and how to minimise it. • Select equipment with lower sound power levels. • Install acoustic barriers in order to minimise the transmission of sound through the barrier. • Limit construction vehicle movement (especially trucks) to and from site to normal working hours only i.e. 6am to 6pm. • Maintain silencers on diesel powered equipment where necessary. • Systematically maintain all forms of equipment. 	Contractor SHE Officer	150,000.00
Loading, Haulage & dumping Vegetation clearance	Pre-Construction, Construction, Operation and Decommissioning	Dust nuisance and health risks	<ul style="list-style-type: none"> • Spray work areas, short access roads around pump stations and storage tanks with grey water to suppress dust. • Provide protective dust masks to workers and ensure that they are worn during all activities that generate dust. • Enforce speed limits on site in order to minimize dust pollution. • Visually monitor dust generation from work zones and implement dust suppression measures. 	Contractor SHE Officer Environmental Officer	150,000.00

Project Activity	Phase	Potential Impacts	Proposed Mitigation Measures	Institutional Responsibility	Estimated Costs (Pula BWP)
			<ul style="list-style-type: none"> Minimise dust from open area sources, including storage piles, by using control measures such as installing enclosures and covers and increasing moisture content 		
All project activities (Social interactions)	Pre-Construction, Construction, Operation and Decommissioning	Possible increase in STIs and HIV/AIDS infections	<ul style="list-style-type: none"> Set up of HIV and AIDS structures in the communities (project areas) to intensify HIV/AIDS awareness campaigns in the district Provide STI screening and treatment on-site for early diagnosis. Ensure availability and access to condoms in the workplace. Provide behavioural change awareness materials on-site and in the nearby communities. Implement the project specific Code of Conduct on HIV/AIDS. 	Contractor SHE Officer Environmental Officer	200,000.00
All project activities (Social interactions)	Pre-Construction, Construction, Operation and Decommissioning	An increase in Covid-19 and other viral disease prevalence rates	<ul style="list-style-type: none"> Provide wash basins with soap at all the sub-project sites to prevent the spread of COVID-19 within the communities. Design the contractor and labourer's camp to avoid the spread of the disease. Conduct awareness sessions in the communities and for sub-project workers on the disease and its risks, as well as the major drivers of COVID-19 spread such as poor sanitation, physical contact and airborne transfer by formally engaging the Ministries of Health and Wellness, Nationality, Immigration and Gender Affairs to harness existing and integrate existing COVID-19 programmes into the sub-project. 	All those involved in construction (Contractors, Sub-Contractors, Engineers and Environmentalist) Community health facilities	500,000.00

Project Activity	Phase	Potential Impacts	Proposed Mitigation Measures	Institutional Responsibility	Estimated Costs (Pula BWP)
			<ul style="list-style-type: none"> • Develop materials that seeks to promote awareness, good hygiene behaviour and social distancing. • Engage the village clinics to provide monthly onsite health talks to provide and promote access to COVID-19 testing services. • Ensure contractor enforces Codes of Conduct for COVID-19 and conducts awareness training on them to ensure all workers are aware of expected behaviours. • Ensure the community is aware of the GM. 		
All project activities (Social interactions)	Pre-Construction, Construction and Decommissioning	Potential increase in Sexual Exploitation and Abuse (SEA), Sexual Harassment (SH) and Violence Against Children (VAC)	<ul style="list-style-type: none"> • Raise awareness to sensitise the construction crew who are not from the region to respect community values and norms. • Comply with monitoring and reporting requirements as per the Codes of Conduct, including age restrictions on any sexual activity (under 18 years of age) and behaviours that constitute GBV, SEA, SH and VAC. • Conduct awareness raising sessions among workers and the community about social ills that are likely to emerge due to interaction of locals with migrant workers. • Liaise closely with the police and other crime law enforcement authorities, NGOs to address GBV, SEA, SH and VAC and other social problems that may be exacerbated by the project. • Engage a GBV service provider to conduct an awareness talk periodically (monthly) on GBV, and their prevention and to provide services to GBV survivors. 	<p>All those involved in construction (Contractors, Sub-Contractors, Engineers and Environmentalist)</p> <p>Department of Gender Affairs</p> <p>Botswana Police Services</p>	P 100, 000.00

Project Activity	Phase	Potential Impacts	Proposed Mitigation Measures	Institutional Responsibility	Estimated Costs (Pula BWP)
			<ul style="list-style-type: none"> • Train project-related staff and residents of the communities in behaviour obligations. To make this effective, all workers will be required to sign an Individual Code of Conduct as presented in Annex 9. Provide training and awareness sessions about the Codes of Conduct to enhance understanding among sub-project workers. • Ensure women have equal opportunity to be hired as this could help address the problem of younger women getting into relationships for financial support and being abused in that process. • Form a GBV, SEA, SH and VAC team as per World Bank's guidelines as presented in Section 11. • Engage police in sensitization and awareness on GBV, SEA, SH and VAC to ensure they are aware of procedures in place and need for survivor-centred procedures and to participate in community and worker training. 		
WATER RESOURCES MANAGEMENT					
Setting up contractor's camp, construction of all project components and decommissioning of project components	Pre-Construction, Construction and Decommissioning	Groundwater contamination	<ul style="list-style-type: none"> • Service construction vehicles and machinery regularly and properly to reduce breakdowns and seal any leakages. Servicing should be done on protected area where spillages can be contained (bunded area that is seepage free). • Provide leak proof receptacles or drums for storing used oil and ensure that they are kept in a protected area. • Provide portable spill containment and clean-up equipment at the project site. 	Contractor Project Manager Resident Engineer Environmental Officer	100,000.00

Project Activity	Phase	Potential Impacts	Proposed Mitigation Measures	Institutional Responsibility	Estimated Costs (Pula BWP)
			<ul style="list-style-type: none"> In the event of a spill, the Contractor shall take prompt action to clear the polluted area and prevent the spread of pollutants. 		
LAND USE					
Excavations and laying of pipes	Construction	Encroachment of pipe infrastructure into people's residence/properties due to inadequate servitudes	<ul style="list-style-type: none"> Establish a good working relationship to allow access for maintenance purposes (where pipeline is too close to private property) Physical inspection of plots against layout plans, and where there are discrepancies, undertake surveying of the plots and produce updated layout plan In case of relocations; compensate affected plot owners should comply with Compensation Guidelines for Tribal Areas 2010 and the prepared Resettlement Policy Framework. 	Contractor Project Manager Resident Engineer Environmental Officer	100,000.00
SOIL MANAGEMENT					
All construction activities (Pipe laying, storage tanks and pump stations construction)	Pre-Construction, Construction and Decommissioning	Soil erosion	<ul style="list-style-type: none"> Apply a 5 cm layer of gravel in areas where the soils are powdery and cannot be effectively compacted. This should be applied over the top of compacted trench material. Implement erosion control measures should be implemented such as wetting down the site to control dust, covering/screening of stockpiles, positioning stockpiles in areas that are not prone to winds. Erect a silt curtain at the outlets at the reservoir sites, to screen runoff water. Minimise erosion during flushing by avoiding discharge areas that are susceptible to erosion and spread the flow to reduce flow velocities 	Contractor SHE Officer Environmental Officer	150,000.00

Project Activity	Phase	Potential Impacts	Proposed Mitigation Measures	Institutional Responsibility	Estimated Costs (Pula BWP)
Around the water reservoir and reverse osmosis (RO) plant sites	Construction and Operation	Soil vulnerability to landslide and ground subsidence	<ul style="list-style-type: none"> • Prepare an investigation plan to investigate the subsurface conditions of these potential sites (water reservoirs and reverse osmosis (TO) plant). • Propose the construction sequencing and any special arrangements necessary to complete the excavation and foundation works at these locations and they have to get approval from the appropriate authorities. • Carryout an analysis of the envisaged impacts of excavation and construction works on nearby and adjacent structures (if any) and recommend safety measures and ways for their protection. 	Design Engineers	100, 000.00
ECOLOGICAL MANAGEMENT					
Clearing for the pipeline, storage tanks, pump stations and camp sites	Pre-Construction, Construction and Decommissioning	Loss of vegetation (clearing of rights-of-way for pipeline and infrastructure construction)	<ul style="list-style-type: none"> • In the bid to reduce amount of vegetation clearing, and hence project's ecological footprint, consider aligning the pipeline route with existing vegetation-cleared routes, where technically feasible. For example, along existing roads, cut lines, firebreaks, water pipelines and disease control fence lines. • Perform a comprehensive systematic inventory of cleared vegetation with particular emphasis on plants of notable conservation significance, i.e. rare species and IUCN Redlist classified species, if there are any within the sites. • Where practical, adjust the water pipeline to avoid large adult protected plant species, e.g. adult mowana tree (<i>Adansonia digitata</i>). 	Contractor Design Engineers Environmental Officer	45, 000.00

Project Activity	Phase	Potential Impacts	Proposed Mitigation Measures	Institutional Responsibility	Estimated Costs (Pula BWP)
All construction and decommissioning activities	Pre-Construction, Construction and Decommissioning	Increased risk of illegal procurement of biodiversity	<ul style="list-style-type: none"> • Conduct training workshops for construction staff on the dangers and possible consequences of illegal use of biodiversity, i.e. effect on biological species conservation, penalties and fines. • Increase monitoring and surveillance for poaching (e.g. regular visits by DWNP and other security agencies). • Consider embedding DWNP/security personnel into construction camps as a preventative strategy. • Report all incidents of poaching to the DWNP, DFRR or Botswana Police Service. • Develop and implement a poaching surveillance and monitoring system. 	Contractor Environmental Officer DWMP & DFRR Botswana Police Services Resource Persons (trainer)	75, 000.00
All construction and decommissioning activities	Pre-Construction, Construction and Decommissioning	Elevated risk of increased incidents of negative human-wildlife interaction (HAC)	<ul style="list-style-type: none"> • Proper management (on-site processing, recycling, wildlife proof waste receptacles, appropriate disposal at designated sites). • Conduct staff training workshops/seminars on HAC (background, presentation, consequences and response procedures). • Undertake routine maintenance and repair leakages as soon as they occur. • Display warnings signs e.g. "Wild animals are dangerous - do not feed or approach too closely" • Develop and implement HAC and wildlife habituation monitoring system. • Report all incident of HAC to the nearest Department of Wildlife and National Parks office or Police Station. 	Contractor Environmental Officer Department of Waste Management & Pollution Control Sowa Town Council & Tutume Sub-District Council Private Waste Management Companies	150, 000.00

Project Activity	Phase	Potential Impacts	Proposed Mitigation Measures	Institutional Responsibility	Estimated Costs (Pula BWP)
All construction activities and water leakages along the project infrastructure	Construction and Operation	Wildlife habituation and modification of behavior	<ul style="list-style-type: none"> • Develop a comprehensive water leaks' monitoring and detection system for early warning • Maintain and repair water infrastructure (leaks). • Monitor spatio-temporal distribution of wildlife populations along the water infrastructure. • Monitor patterns and trends of wildlife mortality due to vehicle collision along the pipeline route. 	Contractor Environmental Officer DWNP Local Conservation NGOs Private Researchers and Specialists Consultants	50,000.00
Excavations of trenches for pipelines	Construction and decommissioning	Increased risk of wildlife mortality due to pitfalls	<ul style="list-style-type: none"> • Keep to the minimum possible the length of trench left open over night. • Ensure that no open trenches are left overnight in close proximity to hydrological features (<250 m); rivers and pans, including pre-existing pipe leakages. • Mark all open trenches with luminous red-white tape to make open trenches more visible to approaching wildlife. • Report all incidents of wildlife pitfalls to the nearest DWNP Office or Botswana Police. 	Contractor Environmental Officer Department of Waste Management and Pollution Control (DWMPC) Botswana Police Service	100,000.00
All construction and decommissioning activities	Pre-Construction, Construction and Decommissioning	Increased incidents of veldt fires	<ul style="list-style-type: none"> • Implement fire suppression measures which include automatic and fire protection equipment such as automatic sprinkler systems, manual portable extinguishers and fire hose reels. • Conduct staff training workshops on basic fire management and response procedures, and fire suppression. 	Contractor Environmental Officer DFRR, DWNP, BPS Resource Persons (trainer)	85,000.00

Project Activity	Phase	Potential Impacts	Proposed Mitigation Measures	Institutional Responsibility	Estimated Costs (Pula BWP)
			<ul style="list-style-type: none"> Develop internal fire reporting, response procedures and fire response plan which includes neighbours. Report all incidents of fires to the nearest Department of Forestry and Range Resources office or any Botswana Police Service station. Monitor fires occurring along the water infrastructure route; frequency, intensity, direction and possible expansion. 		
All construction activities	Pre-Construction, Construction and Decommissioning	Pollution of the natural environment	<ul style="list-style-type: none"> Develop waste management systems for disposal of the various waste material generated from construction and decommissioning phases. Sort and where possible manage waste onsite (e.g. drying and burning or burying of organic and waste food). Reuse and/or recycle waste material as much as possible, e.g. some of the waste pipes can be sold to local farmers. Dispose of all waste material at nearest designated sites; i.e. landfills, sewage ponds. Where applicable, pay of local council levies and rates or engage private waste management companies to collect dispose waste materials. Develop and implement a waste monitoring system (quantity, frequency of disposal and others). 	Contractor Environmental Officer DWMPC Sowa Town Council & Tutume Sub-District Council Private Waste Management Companies	150,000.00
ARCHAEOLOGICAL AND CULTURAL MANAGEMENT					
Clearing for the pipeline, storage tanks,	Pre-Construction, Construction and Decommissioning	Uninformed destruction of archaeological materials	<ul style="list-style-type: none"> Make sure an archaeologist is on site after clearing the vegetation and during 	An archaeologist of approved credentials by the National Museum	50,000.00

Project Activity	Phase	Potential Impacts	Proposed Mitigation Measures	Institutional Responsibility	Estimated Costs (Pula BWP)
pump stations and camp sites			<p>construction to guard against uninformed destruction of archaeological materials.</p> <ul style="list-style-type: none"> Salvage chance archaeological, cultural and palaeontological discoveries. 		
All Operation activities	Operation	Risks due to unplanned emergencies	<ul style="list-style-type: none"> Develop an Emergency Preparedness Plan to address preventing and mitigating the environmental impact that is associated with emergency events. Periodically review and test emergency preparedness procedures, as well as whenever an incident occurs. Actively assess operational risks for individual sites to ensure that emergency response procedures prepare the sites to effectively respond to emergency situations. The assessment process should test planned responses and evaluate how effectively they deal with the consequences of an unplanned event. Develop a properly trained emergency response team staffed by operating personnel and led by a trained emergency response coordinator drawn from management-level personnel. Identify proper emergency equipment and develop a program for practice drills must be developed to ensure response measures are effective and understood. 	WUC Management	Part of operation cost budget by WUC
Operation of the water scheme	Operation	Improved livelihoods due to water availability	<ul style="list-style-type: none"> Maintain the public stand pipes and the related infrastructure systematically to ensure that they are kept in good working order. 	WUC Management	Part of operation cost budget by WUC

Project Activity	Phase	Potential Impacts	Proposed Mitigation Measures	Institutional Responsibility	Estimated Costs (Pula BWP)
			<ul style="list-style-type: none"> • Mobilise community members to reticulate water to their plots to reduce pressure on the use of the public stand pipes. • Implement public awareness on wise water usage and taking care of the water infrastructure. • Sensitise school children on water management. • Community leadership and S&CD Office to request WUC to develop a programme that allows people to pay for water connection in instalments and the connection only done once they have paid off the fee. • Find out if it is possible to install the prepaid water taps to the households to avoid people not being able to pay bills and their water supplies being disconnected, and then being faced with the payment for reconnection and the outstanding bills. 		
Operation of the water scheme (Water extraction)	Operation	Groundwater over-mining (Depletion)	<ul style="list-style-type: none"> • Avoid groundwater resources pollution from the surrounding area. • Find long-term alternative water sources for sub-project villages that can be used to help replenish aquifers. Deriving water from other sources would also give aquifers time to refill instead of pumping too much water from them at once. • Monitor groundwater usage by WUC in the area and activities that can contribute to the water resource pollution. 	WUC Management	Part of operation cost budget by WUC

Project Activity	Phase	Potential Impacts	Proposed Mitigation Measures	Institutional Responsibility	Estimated Costs (Pula BWP)
			<ul style="list-style-type: none"> Optimise pumping rates and frequency of project boreholes by WUC to avoid over pumping. 		
Operation of the water scheme	Operation	Water supply disruptions due to vandalism/theft of infrastructure	<ul style="list-style-type: none"> Raise community awareness on pipe vandalism and its consequences such as water shortage and the associated reduction in water pressure. This should be done by WUC through the village leadership. Provide lockable manhole covers and locks for all the manholes including valve chambers. Monitor telemetry and SCADA to identify pipe leaks and urgently respond to the leakages to minimise the subsequent pipe vandalism by wildlife especially elephants. Provide an electric perimeter fence and provide metal spikes embedded on a perimeter concrete apron to deter elephants. 	WUC Management	Part of operation cost budget by WUC
Operation of the water scheme (Reverse Osmosis)	Operation	Potential risk of groundwater pollution from discharges of brine effluent (with high salt concentration) due to leakages from the evaporation ponds or feeder pipes	<ul style="list-style-type: none"> Train and supervise workers that clear the dried salt from ponds, using plastic brushes and plastic shovels to reduce potential damage to the liner. Implement a robust monitoring schedule to identify potential leakages from ponds and pipes. Linked to this, the monitoring data on evaporation rates will provide a useful baseline for identifying ponds that might have leaks, because water levels in the ponds would be dropping quicker than expected. Include a controlled overflow channel in the design of the evaporation ponds, for better 	WUC Management	Part of operation cost budget by WUC

Project Activity	Phase	Potential Impacts	Proposed Mitigation Measures	Institutional Responsibility	Estimated Costs (Pula BWP)
			management of impacts of extreme rainfall events and floods.		
Operation of the water scheme (Reverse Osmosis)	Operation	Potential risk of groundwater and environmental pollution from sludge and backwash from the pre-treatment	<ul style="list-style-type: none"> • Dilute the sludge to reduce the risk of blockage to pipes. • Train and supervise workers so that pipes do not become blocked from incorrect disposal of other objects into the system. • Implement a robust monitoring schedule to identify potential leakages from pipes and carry out repairs at an early stage 	WUC Management	Part of operation cost budget by WUC
Operation of the Reverse Osmosis plant (evaporation ponds)	Operation	Potential drowning of animals accessing the evaporation ponds area	<ul style="list-style-type: none"> • Fence the site, mainly with the intention of preventing people from entering the site, but this will also prevent mammals entering the site. Birds in particular tend to be able to identify salty water and will not be impacted. WUC will include recording bird species, when observed at the site during operation. 	WUC Management	Part of operation cost budget by WUC
ESTIMATED TOTAL COSTS IN BWP					3,950,000.00

10.4 Monitoring Plan

Monitoring is the activity undertaken to provide specific information on the characteristics and functioning of environmental and social variables in space and time. This involves monitoring the achievement of targets or the performance of certain management actions concerned with the project. The impacts to be monitored in **Table 72** were selected because they are potentially highly significant negative impacts, and they will need regular monitoring to ensure that they adhere to the stipulated threshold.

10.4.1 Monitoring Indicators

Monitoring indicators are used to monitor environmental changes, assess the efficacy of mitigation measures, and provide warning signals for impending environmental shifts. The following are important:

- Parameter to be monitored
- Source/location of monitoring
- Key performance indicator
- Methods of monitoring
- Responsible agent for monitoring
- Frequency of monitoring

Table 72: Monitoring Table

Potential Environmental Impacts	Parameters to be Monitored	Location	Key Performance Indicator	Method of Monitoring	Responsible Agent for Monitoring	Frequency of Measurement	Reporting Mechanism	Threshold or Existing Standard	Recommended Action when Threshold is Exceeded
WASTE MANAGEMENT									
Improper waste handling and disposal	<p>Waste Management</p> <p>Section 34 of the Waste Management Act makes it an offence to indiscriminately dump litter at a place not so gazette</p> <p>Waste Management Procedure Section 5 Item 5.1; Waste segregation</p> <ul style="list-style-type: none"> - Colored bags - Specific containers 	Construction sites, offices and camp sites	Waste Collection Manifest	<p>Visual observations</p> <p>Indication of sorting at source</p> <p>Indication of collection by DWMPC licensed operators</p> <p>Record of frequency of collection and disposal at dumping sites</p>	<p>Enviro Solve</p> <p>Site Agent</p> <p>Tribal Administration</p> <p>Sowa Town Council & Tutume Sub-District Council</p> <p>Department of Waste Management and Pollution Control</p>	Weekly	<p>ESMP monthly monitoring report</p> <p>Site Agent's Report</p>	Waste Management Act, Public Health Act	Work should be halted until proper clean-up is done
SOCIAL MANAGEMENT									

Potential Environmental Impacts	Parameters to be Monitored	Location	Key Performance Indicator	Method of Monitoring	Responsible Agent for Monitoring	Frequency of Measurement	Reporting Mechanism	Threshold or Existing Standard	Recommended Action when Threshold is Exceeded
Disruption of public routes or access	Access disruption to public routes	Project villages	Length and duration of open trenches (trenches should be 2 km and closed within 12 hours) Provision of temporary crossings Presence of danger warning tapes	Visual inspection and use of measuring wheel to measure the length Visual inspection of temporary crossings and danger warning tapes	Enviro Solve Site Agent Sowa Town Council & Tutume Sub-District Council	Daily	ESMP monthly monitoring report Site Agent report	No blockage for more than 12 hours	The contractor should provide temporary access or backfill to unblock access
Damage to property due to vibrations caused by blasting	Vibration levels from construction works	Near sensitive receptors along the project villages	Vibrations at acceptable minimum levels	Taking of readings from seismograph to measure vibration levels	Enviro Solve Site Agent Sowa Town Council & Tutume Sub-District Council	Throughout the blasting activity.	Vibration levels presented graphically to determine the trend against set standards	Vibration of below 40Hz	Compensate those affected by vibration from construction works
Provision of unskilled, semi-skilled and skilled employment	Number of workers from the project villages Employment Act CAP 47:01 Item (1) – The Act advocates for equal opportunities for	Construction sites and camp sites/offices	At least 60% of unskilled workers are from project villages and should include the vulnerable community members At least 25% of vulnerable community hired	Records of people employed Audits of employment records	Enviro Solve PIU Tribal Administration Sowa Town Council & Tutume Sub-	Monthly	Environmental Officer through Monthly monitoring reports and submission to DEA	At least 60% of all workers are from the project villages At least 25% of vulnerable community hired	The Construction work should be stopped until people from the project villages are hired

Potential Environmental Impacts	Parameters to be Monitored	Location	Key Performance Indicator	Method of Monitoring	Responsible Agent for Monitoring	Frequency of Measurement	Reporting Mechanism	Threshold or Existing Standard	Recommended Action when Threshold is Exceeded
	qualifying applicants, irrespective of gender, tribe, religion, or political beliefs		At least 25% women are hired		District Council			At least 25% women are hired	
Enhanced socio-economic development (livelihoods improvement)	Purchasing power and sales of goods and services Employment Act CAP 47:01 Item (1) – The Act advocates for equal opportunities for qualifying applicants, irrespective of gender, tribe, religion, or political beliefs	Entire project area	Number of people employed by the project	Review of employment records	Enviro Solve PIU	Monthly	Environmental Officer through Monthly monitoring reports and submission to project committee	Employment Act	Assess requirement and comply with the ESMP
Erosion of societal norms and values and Gender Based Violence (GBV)	GBV incidents	Entire project area	Number of GBV cases recorded	Observation Document review/list of GBV cases-GM monitoring log Sport checks with workers/commun	Enviro Solve PIU and CLO SHE Officer Social Worker	Daily	Environmental; Monthly monitoring reports to the project committee	Requirement of ESMP, EA Act 2010 Requirement of GM	Assess requirement and comply with the ESMP GM must be properly used and all GBV cases

Potential Environmental Impacts	Parameters to be Monitored	Location	Key Performance Indicator	Method of Monitoring	Responsible Agent for Monitoring	Frequency of Measurement	Reporting Mechanism	Threshold or Existing Standard	Recommended Action when Threshold is Exceeded
				ity to ask them their views about how the project is affecting their norms and values	Botswana Police Services		PIU monthly reports Community liaison monthly report	GM Requirements	recorded and properly resolved
HEALTH AND SAFETY MANAGEMENT									
Potential accidents and injuries	Accidents and incidents	Entire project area	Number of accidents and incidents	Visual observations Review of accident and incident reports	Enviro Solve SHE Officer	Daily	ESMP monthly monitoring report Site Agent Report	Factories Act Public Health Act Mines Quarries and Machinery Act	The contractor should engage Occupational, Health, Safety and Environment specialists to conduct awareness on work related accidents
Potential trench collapse (cave-ins)	Unprotected/unstable open trenches	Throughout the construction site where there is trenching	Number of cave-ins/collapse of trenches Percentage of protected trenches against total excavations dug Distance of placement of stockpiles and heavy equipment from trenches	Measurement (Tape measures and measuring wheel) Visual observations	Enviro Solve Site Agent	Daily	ESMP monthly monitoring report Site Agent report	All dug trenches	The contractor should be ordered to protect the trench walls or backfill it

Potential Environmental Impacts	Parameters to be Monitored	Location	Key Performance Indicator	Method of Monitoring	Responsible Agent for Monitoring	Frequency of Measurement	Reporting Mechanism	Threshold or Existing Standard	Recommended Action when Threshold is Exceeded
Increased traffic and road traffic related accidents	Road Traffic Related accidents	Entire project area	Number of road traffic education given to drivers and workers Number and types of road signs erected Number of road traffic offences committed	Review of police records Review of site minutes for road traffic education talks	Enviro Solve Site Agent Traffic Police, Sowa Town Council and Tutume Sub-District Council	Monthly	ESMP monitoring report Site Agent report	Road Traffic Act and Regulations Road Traffic Act (69:01) Section 44 (4a), stipulates that a lower speed limit shall be imposed on a road as considered necessary in the circumstances where road repairs and reconstruction of a road for public safety and to prevent damage escalation on the road.	Contractor should be ordered to implement road traffic education Action should be taken against regular offenders which should include expulsion from site
Risks due to unplanned emergencies	Unplanned emergencies	The entire project footprint	Availability of an Emergency Preparedness Plan	Observation and review of the Emergency	Enviro Solve Site Agent	Opportunistically when there is an emergency	Environmental Officer; Monthly monitoring	An unplanned event beyond the scope of	Implement the Emergency Preparedness Plan

Potential Environmental Impacts	Parameters to be Monitored	Location	Key Performance Indicator	Method of Monitoring	Responsible Agent for Monitoring	Frequency of Measurement	Reporting Mechanism	Threshold or Existing Standard	Recommended Action when Threshold is Exceeded
			Personnel for an Emergency Preparedness Plan Emergency preparedness drills	Preparedness Plan	Department of Waste Management and Pollution Control PIU Safeguards		reports to the project committee and DEA	safe work practices and not covered by occupational health and safety	
Noise pollution	Noise	Entire project area	Noise levels Number of complaints/grievances on noise received	Observation List of complaints (document review) Measurement by use of Sound Level Metre	Enviro Solve Site Agent Tribal Administration Sowa Town Council & Tutume Sub-District Council Department of Waste Management and Pollution Control	Opportunistically when there is an above average noise generating activity	Environmental Officer; Monthly monitoring reports to the project committee and DEA	Allowable noise level occupational exposure limit (OEL) 85dB during the day BOS 575: 2013 Maximum permissible noise levels for continuous and/or intermittent noise dBA(L _{eq}) 85dB for 8hrs/day	Work should be halted until source of noise is identified and corrected
Dust nuisance and health risks	Dust	All active construction sites	Dust emissions of PM ₁₀	Visual observation List of complaints	Enviro Solve Site Agent	Opportunistically when there is a dust generating activity	ESMP Monthly Monitoring Report	Atmospheric Pollution Act Dust levels PM ₁₀ ≤ 200	Work should be halted until dust suppression measures are implemented

Potential Environmental Impacts	Parameters to be Monitored	Location	Key Performance Indicator	Method of Monitoring	Responsible Agent for Monitoring	Frequency of Measurement	Reporting Mechanism	Threshold or Existing Standard	Recommended Action when Threshold is Exceeded
				Measurement by use of Handheld Air Sampler	Department of Waste Management and Pollution Control		Site Agent's Report	µg/m ² (DWMPC Guidelines) Aerosols 200 µg/m ³ / and greenhouses gases 100 µg/m ³	
Possible increase in STIs and HIV/AIDS infections	HIV and AIDS	Entire project area	<p>Number and type of HIV awareness information in place</p> <p>Record of HIV awareness meetings and training undertaken per month</p> <p>Record of HIV counselling and testing held</p>	<p>Number of new infections (Document review)</p> <p>Audit of HIV and AIDS records</p>	<p>Tutume Sub-District Health Management Team</p> <p>Enviro Solve</p> <p>Site Agent</p>	Monthly	<p>ESMP monitoring report</p> <p>Site Agent report</p> <p>Tutume Sub-District Health Management report</p>	<p>Public Health Act</p> <p>HIV/AIDS Policy</p> <p>Botswana National HIV/AIDS Strategic Framework (1998)</p> <p>Encourage the proponent to educate their workers on the matters relating to HIV/AIDS during project construction</p>	The contractor should be instructed to implement the HIV/AIDS/STIs awareness programmes within the time frame set by the PLO

Potential Environmental Impacts	Parameters to be Monitored	Location	Key Performance Indicator	Method of Monitoring	Responsible Agent for Monitoring	Frequency of Measurement	Reporting Mechanism	Threshold or Existing Standard	Recommended Action when Threshold is Exceeded
An increase in COVID-19 and other viral disease prevalence rates	Incidences of COVID-19	Entire project area	Number of people infected Use of masks for COVID-19 COVID-19 Register availability and infrared thermometers Availability of Hand Sanitizers Availability of Handwashing stations, water and soap	Temperature record COVID-19 Registration register	District Health Management Team District COVID-19 Team Enviro Solve SHE Officer PLO	Weekly	All stakeholders led by District Health Officials; Weekly COVID-19 Report	Public Health Act COVID-19 Regulations and Protocols	Enforce COVID-19 Regulations and Protocols Provide COVID-19 trainings
Potential increase in Sexual Exploitation and Abuse (SEA), Sexual Harassment (SH) and Violence Against Children (VAC)	GBV, SEA, SH AND VAC/VAC incidents	Entire project area	Number of GBV, SEA, SH AND VAC/VAC cases recorded	Observation Document review/list of GBV, SEA, SH AND VAC/VAC cases- GM monitoring log Audit of GBV, SEA, SH and VAC records	Enviro Solve PIU and CLO Social Worker Botswana Police Services	Daily	ESMP monthly monitoring reports PIU monthly reports Community liaison monthly report	Requirement of ESMP, EA Act 2010 Requirement of GM GM Requirements	Assess requirement and comply with the ESMP GM must be properly used and all GBV, SEA, SH AND VAC/VAC cases recorded and properly resolved
WATER RESOURCES MANAGEMENT									

Potential Environmental Impacts	Parameters to be Monitored	Location	Key Performance Indicator	Method of Monitoring	Responsible Agent for Monitoring	Frequency of Measurement	Reporting Mechanism	Threshold or Existing Standard	Recommended Action when Threshold is Exceeded
Groundwater Contamination	Water quality: total petroleum hydrocarbons (Benzene, Hexane, Toluene, Xylenes, Naphthalene and Fluorine)	Around the construction and decommissioning on sites	Changes in pH, TDS, major ions, benzene, hexane, toluene, xylenes, naphthalene and fluorine	Grab samples, laboratory analysis for Total Petroleum Hydrocarbons and Chemistry	Contractor Engineer SHE	Monthly	Environmental Officer SHE officer WUC	BOS 32:2009 specifications for drinking water and Hydrocarbons and chemistry should not exceed baseline levels	Areas contaminated with oils, fuels and greases should be treated immediately to minimize such incidents. Where there are serious spills the area should be cordoned off while the spill is being contained.
LAND USE MANAGEMENT									
Encroachment of pipe infrastructure into people's residence/properties due to inadequate servitudes	Encroachment to properties Tribal Land Act 1968, Section 33 (2) provides that compensation is payable when land is required for project and the acquiring body is financially responsible for all aspects of the project; this include payment	Project villages	Number of residences/properties or roads affected by excavation Period of time of blockage	Visual observations Time keeping for blockage period	Enviro Solve Site Agent Sowa Town Council & Tutume Sub-District Council	Daily during construction phase	ESMP monitoring report Site Agent report	Tribal Land Act No blockage for more than 12 hrs	The contractor should backfill to unblock access

Potential Environmental Impacts	Parameters to be Monitored	Location	Key Performance Indicator	Method of Monitoring	Responsible Agent for Monitoring	Frequency of Measurement	Reporting Mechanism	Threshold or Existing Standard	Recommended Action when Threshold is Exceeded
	for compensation to claimants. The displaced may be granted the right to use other land available, and is entitled to adequate compensation.								
SOIL MANAGEMENT									
Soil erosion	Upland soil surface erosion, other than gully erosion	All excavated areas/working areas along the pipeline routes	Depth of eroded soil	Number of erosional features visible on site Measurement with a graduated stick Visual observations	Enviro Solve Site Agent	Weekly	ESMP monitoring report Site Agent report	No new erosional features initiated on site	Contractor should rehabilitate damaged/eroded areas Contractor should attend to areas which need attention as directed by the Environmentalist
Soil vulnerability to landslide and ground subsidence	Landslides and ground subsidence	Reservoir tank and reverse osmosis (RO) plant sites	Landslides (magnitude of tilting and tilt direction) and ground subsidence	The magnitude of tilting and tilt direction (Tilt Meter) Measuring subsidence using a soil extensometer	WUC	Monthly	ESMP monthly monitoring report	To established by the Geotechnical study	The Geotechnical study should recommend mitigation measures in case the established thresholds are exceeded.

Potential Environmental Impacts	Parameters to be Monitored	Location	Key Performance Indicator	Method of Monitoring	Responsible Agent for Monitoring	Frequency of Measurement	Reporting Mechanism	Threshold or Existing Standard	Recommended Action when Threshold is Exceeded
ECOLOGICAL MANAGEMENT									
Loss of vegetation (clearing of rights-of-way for water infrastructure construction)	Vegetation loss	Pipeline route and other construction sites	Length of new pipeline along existing liner structures Length of pipeline along wellfields-RWT-WTP water line route Amount or area of vegetation cleared Amount & number of species of conservation concern destroyed	Distance measurements (& GIS) Distance measurements (& GIS) GIS & mapping (global positioning system) Species identification & frequency count Visual observations	Enviro Solve DFRR	Routine (daily, weekly, monthly)	ESMP monthly monitoring report	Herbage Preservation Act	Instruct contractor to confine vegetation clearance to the pipeline and other infrastructure footprints
Increased risk of illegal procurement of biodiversity	Illegal procurement of biodiversity	Entire project area	Number or percentage of staff trained Number of cases of illegal acquisition of biodiversity	Resource persons, training materials & attendance register Spot checks, informants, poaching registers	Enviro Solve DWNP Botswana Police Services	Routine (weekly, monthly) Routine & opportunistic	ESMP monthly monitoring report DWNP, BPS	Wildlife Conservation and National Parks Act	Contractor should undertake awareness training on illegal procurement of biodiversity

Potential Environmental Impacts	Parameters to be Monitored	Location	Key Performance Indicator	Method of Monitoring	Responsible Agent for Monitoring	Frequency of Measurement	Reporting Mechanism	Threshold or Existing Standard	Recommended Action when Threshold is Exceeded
			<p>Man days of security personnel spent at the project</p> <p>Number of poaching cases reported to DWNP & DFRR</p> <p>Trends & patterns of poaching (species, distribution & frequency)</p>	<p>Formal agreements with security agencies</p> <p>DWNP & Police poaching registers & occurrence books</p> <p>Private consultant, poaching monitoring registers, monitoring systems, reporting procedures</p>					
Elevated risk of increased incidents of negative human-wildlife interaction (HAC)	Human wildlife interaction	Entire project area	<p>Amount of waste treated onsite and recycled or sold</p> <p>Number or percentage of staff trained</p> <p>Frequency & distribution of repairs</p>	<p>Tonnage or number of trucks removing waste</p> <p>Resource persons, training materials & attendance register</p> <p>Repair & maintenance log</p>	<p>Enviro Solve Site Agent</p> <p>DWNP</p> <p>Botswana Police Services</p>	<p>Routine (daily/weekly)</p> <p>Routine & opportunistic</p>	<p>ESMP monthly monitoring report</p> <p>DWNP</p>	<p>Wildlife Conservation and National Parks Act</p>	<p>Instruct the contractor to clean up the site</p> <p>Provide training on HAC for employees</p>

Potential Environmental Impacts	Parameters to be Monitored	Location	Key Performance Indicator	Method of Monitoring	Responsible Agent for Monitoring	Frequency of Measurement	Reporting Mechanism	Threshold or Existing Standard	Recommended Action when Threshold is Exceeded
			<p>Number & types of warning signs displayed</p> <p>Diversity and frequency of habituated and problem animals</p> <p>Number of HAC or habituated animals reported to DWNP</p>	<p>sheets or job cards</p> <p>Number of warnings signs sustained over construction phase</p> <p>Private Consultant, HAC & Habituation log sheets, structured surveys & opportunistic</p> <p>DWNP occurrence books & HAC registers</p>					
Wildlife habituation and modification of behaviour	Changes in wildlife distribution and mortality	Entire project area	<p>Frequency and distribution of water leaks</p> <p>Frequency & distribution of repairs</p> <p>Wildlife distribution (species, frequency, time)</p>	<p>Structured routine surveys (e.g. spoor count, camera traps)</p> <p>Number of reported road accidents involving wildlife</p>	Department of Wildlife and National Parks	<p>Routine & Opportunistic (reports)</p> <p>Structured (Daily, weekly or seasonally)</p>	<p>DWNP</p> <p>Private Researchers</p>	Wildlife Conservation and National Parks Act	Leakages should be identified and repaired as soon as possible

Potential Environmental Impacts	Parameters to be Monitored	Location	Key Performance Indicator	Method of Monitoring	Responsible Agent for Monitoring	Frequency of Measurement	Reporting Mechanism	Threshold or Existing Standard	Recommended Action when Threshold is Exceeded
			Frequency & distribution of wildlife mortality (species, location & time)						
Increased risk of wildlife mortality due to pitfalls	Injuries and mortality due to pitfalls	Pipeline routes	Number or record of injuries and mortality Distance of open trenches	Daily inspections of trenches	Department of Wildlife and National Parks Botswana Police Service	Daily	DWNP ESMP monthly monitoring report	Wildlife Conservation and National Parks Act	Revise and reduce the amount/distance of open trenches and backfill trenches as soon as possible
Increased incidents of veldt fires	Veldt fires	Entire project area	Number or percentage of staff trained Fire reporting procedures (document) Fire incidents filed with DFRR, BPS or DWNP Frequency, distribution of veldt fires & area burnt	Resource persons, training materials and attendance register Private consultant, official fire response and reporting procedures Fire reports from DFRR, BPS and DWNP Subscribe to fire monitoring systems (e.g. Advanced Fire	Enviro Solve DFRR DWNP BPS	Opportunistic Routine (daily & monthly)	ESMP monthly monitoring report DFRR. DWNP. BPS ADIS-MERAKA subscription	Herbage Preservation Act Wildlife Conservation and National Parks Act	Contractor should provide awareness training on how to prevent veldt fires and how to fight them

Potential Environmental Impacts	Parameters to be Monitored	Location	Key Performance Indicator	Method of Monitoring	Responsible Agent for Monitoring	Frequency of Measurement	Reporting Mechanism	Threshold or Existing Standard	Recommended Action when Threshold is Exceeded
				Information System – www.afis.meraka.org.za) for daily data on fire risk assessments, active fires and monthly burnt area					
Pollution of the natural environment	Pollution of the environment by waste	Entire project area	<p>Waste management system & protocols (document)</p> <p>Amount of waste sorted and managed/correctly disposed off onsite</p> <p>Amount of waste material recycled or re-used</p> <p>Amount (tonnage or number of trips) of waste disposed of at designated sites</p> <p>Amount paid in levies and/or number/length of</p>	<p>Direct observation</p> <p>Measurement of weight or number of truck loads/trips</p> <p>Direct measurement; tonnage, length, volume, truck loads etc)</p> <p>Measurement of weight or number of truck loads/trips</p> <p>Receipts & contracts</p>	<p>Enviro Solve</p> <p>Site Agent</p> <p>DWMPC</p>	Routine (weekly)	<p>ESMP monthly monitoring report</p> <p>DWMPC</p> <p>Sowa Town Council and Tutume Sub-District Council</p> <p>Private Waste Management Companies</p>	Waste Management Act	Contractor should halt works and undertake site clean-up

Potential Environmental Impacts	Parameters to be Monitored	Location	Key Performance Indicator	Method of Monitoring	Responsible Agent for Monitoring	Frequency of Measurement	Reporting Mechanism	Threshold or Existing Standard	Recommended Action when Threshold is Exceeded
			contract with private companies Waste monitoring system (document) Amount of waste handled, managed, and disposed off properly	Document, with all waste monitoring procedures					
ARCHAEOLOGICAL AND CULTURAL MANAGEMENT									
Uninformed destruction of Archaeological/Cultural Historical Resources	Presence of Archaeological/cultural/historical resources	Entire project site	Number of days archaeological monitoring is undertaken Chance find procedures are invoked	Archaeological Awareness Programme/ Induction Archaeological Watching Brief and Monitoring	Enviro Solve (Archaeologist) Site Agent Department of National Museum and Monuments	Daily	Archaeologist Monthly monitoring report to DNMM	Monuments and Relics Act	Work should be stopped immediately until the archaeological artefact is cleared or salvaged
Risks due to unplanned emergencies	Unplanned emergencies	Entire project area	Availability of an Emergency Preparedness Plan Personnel for an Emergency Preparedness Plan Emergency preparedness drills	Observation and review of the Emergency Preparedness Plan	WUC	Opportunistically when there is an emergency	Monthly monitoring by WUC operators	An unplanned event beyond the scope of safe work practices and not covered by occupational	Implement the Emergency Preparedness Plan

Potential Environmental Impacts	Parameters to be Monitored	Location	Key Performance Indicator	Method of Monitoring	Responsible Agent for Monitoring	Frequency of Measurement	Reporting Mechanism	Threshold or Existing Standard	Recommended Action when Threshold is Exceeded
								health and safety	
Improved livelihoods due to water availability	Water availability	Entire project area	Number of complaints from the community Number of new beneficiaries	Review of register of complaints Inspection of the water supply system	WUC	Monthly inspection of system	Monthly monitoring by WUC operators	Complaints of water shortage from the community	Assess project requirements and implement them fully
Groundwater over-mining (Depletion)	Lowering of the water table in the BHs Reduction of water in surface water bodies in the area Land subsidence Water quality	Wellfield	Water table Amount of surface water in water bodies Geodetic marks Water quality	Measuring water table in BHs and surface water bodies, monitoring geodetic markers. Collecting and testing water quality,	WUC	Monthly inspection of system	Monthly monitoring by WUC operators	Groundwater depth in operating boreholes reaching below dangerous levels, or below water pumping zone. Changes in water quality	Immediate stoppage of groundwater pumping to allow for recharge
Water supply disruptions due to vandalism/theft of infrastructure	Water leakages Damage to project infrastructure	Along the water pipelines and other project components	Water leaks Damaged infrastructure	Monitoring telemetry and SCADA system Physical inspection of project infrastructure	WUC	Daily monitoring of telemetry and SCADA system Weekly physical inspections	Monthly monitoring by WUC operators	Changes in water pressure and shortage of water	Repair damages to infrastructure immediately Replace damaged infrastructure immediately

Potential Environmental Impacts	Parameters to be Monitored	Location	Key Performance Indicator	Method of Monitoring	Responsible Agent for Monitoring	Frequency of Measurement	Reporting Mechanism	Threshold or Existing Standard	Recommended Action when Threshold is Exceeded
Potential risk of groundwater pollution from discharges of brine effluent (with high salt concentration) due to leakages from the evaporation ponds or feeder pipes	Water quality	Reverse Osmosis evaporation Ponds	Water leaks Damaged infrastructure	Monitoring telemetry and SCADA system Collecting and testing water quality, Physical inspection of project infrastructure	WUC	Daily monitoring of telemetry and SCADA system Weekly physical inspections	Monthly monitoring by WUC operators	Changes in water quality The Botswana Integrated Water Resources Management & Efficiency Plan (2013)	Replace damaged infrastructure immediately Leakages should be identified and repaired as soon as possible
Potential risk of groundwater and environmental pollution from sludge and backwash from the pre-treatment	Water leakages	Reverse Osmosis evaporation Ponds	Water leaks Damaged infrastructure	Monitoring telemetry and SCADA system Physical inspection of project infrastructure	WUC	Daily monitoring of telemetry and SCADA system Weekly physical inspections	Monthly monitoring by WUC operators	Changes in water quality The Botswana Integrated Water Resources Management & Efficiency Plan (2013)	Replace damaged infrastructure immediately Leakages should be identified and repaired as soon as possible
Potential drowning of animals accessing the evaporation ponds area	Mortality due to drowning Damaged/vandalised fence	Reverse Osmosis evaporation ponds	Dead animals around the evaporation ponds area	Direct observation	WUC DWNP	Daily recording of dead animals around the evaporation ponds	Monthly monitoring and recording of dead animals around the evaporation ponds	Fence off the evaporation ponds Wildlife Conservation and National Parks Act	Construction of a boundary wall around the evaporation ponds that is not easily damaged like a fence.

11. CONCLUSION AND RECOMMENDATIONS

11.1 Conclusion

The consultations with the project communities revealed that there is water shortage and the main issue related to water quality is salinity. The water quality analysis indicated microbiological activity and elevated TDS and Na concentrations which exceeded the BOS32:2015 drinking water quality standards. There are low water pressures in the project areas, and this forces some communities to queue for water during the night especially at Moseitse and Dukwi villages since the pressure increases due to limited water use during the night. There are high water losses due to pipe bursts because of pipe clogging, vandalism at pipe air valves to water livestock and vandalism by elephants. The water losses are also due to the old infrastructure which easily breaks down. Therefore, the sub-project should provide adequate water and properly treated to meet the BOS32:2015 drinking water quality standards.

The study identified the villages of Kutamogoree, Moseitse and Manxotae as largely composed of the community of Basarwa who according to World Bank's OP 4.10 Safeguard Policy are classified as Indigenous Peoples but in the case of Botswana they are referred to as Vulnerable Communities. The Dukwi Refugee Camp which was established to provide asylum for refugees from various countries has also been identified as a Vulnerable Community. A Vulnerable Community Plan (VCP) will be prepared for all the Vulnerable Communities to assess the impacts of the sub-project on their livelihoods and culture.

The surveyed route proposed for development did not yield any heritage material, and this could be attributed to the fact that a large part of the study area has been transformed in the past by bush clearing and other related human activities. This might have disturbed or damaged the archaeological or heritage landscape of the proposed development area. The existing developments in and around the study area have already changed the character of the area but do not seem to have impacted negatively on any cultural resources in the area. Since excavations were not undertaken, no indications of stratified archaeological deposits were noted. Since subsurface materials may be uncovered in the project area during construction, an Archaeological Watching Brief and Monitoring Program should be implemented during all stages of the project that involve the disturbance of the subsurface.

11.2 Recommendations

11.2.1 Social

- Contractor should notify communities of job opportunities at start up and types and number of labourers and skilled people required.
- The Contractor to be encouraged to procure goods and services from local service providers.
- The Contractor should bring mostly skeletal staff composed of semi-skilled and skilled workers and the unskilled labour should be sourced from the project villages.
- Camps should be utilised for housing plant and not for worker's accommodation to minimize the social impacts associated with labour camps.
- If a labour camp is necessary, its location should be approved by the Environmental Officer and the Social Officer, and it should be located away from villages. A Labour Influx Management Plan and a worker Code of Conduct should be developed to manage the risks of labourer's camps.

11.2.2 Water

- Avoid groundwater resources pollution from the surrounding area.

- Find long term alternative water sources for sub-project villages that can be used to help replenish aquifers. Deriving water from other sources would also give aquifers time to refill instead of pumping too much water from them at once.
- Monitor groundwater usage by WUC in the area and activities that can contribute to the water resource pollution.
- Optimise pumping rates and frequency of project boreholes by WUC to avoid over pumping.
- Service construction vehicles and machinery regularly and properly to reduce breakdowns and seal any leakages.
- Servicing should be done on protected area where spillages can be contained (bunded area that is seepage free).
- Provide leak proof receptacles or drums for storing used oil and they should be kept in a protected area.
- Provide portable spill containment and clean-up equipment at the project site.
- In the event of a spill, the Contractor shall take prompt action to clear the polluted area and prevent the spread of pollutants.

11.2.3 Soil

- Geotechnical investigation studies should be conducted at the reservoir and RO plant sites prior to construction to capture various issues including potential landslides and ground subsidence.
- The access road to the sub project boreholes should be improved especially where there is black cotton soil to make it passable especially during the rainy season.

11.2.4 Ecology

- In a bid to reduce amount of vegetation clearing, and hence project's ecological footprint, consider aligning the pipeline route with existing vegetation-cleared routes, where technically feasible. For example, along existing roads, cut lines, firebreaks, water pipelines and disease control fence lines.
- Perform a comprehensive systematic inventory of cleared vegetation with particular emphasis on plants of notable conservation significance, i.e., rare species and IUCN Redlist classified species, if there are any within the sites.
- Where practical, adjust the water pipeline to avoid large adult protected plant species, e.g., adult Mowana trees (*Adansonia digitata*).

11.2.5 Land Use

- Establish a good working relationship to allow access for maintenance purposes (where pipeline is too close to private property).
- Physical inspection of plots against layout plans, and where there are discrepancies, undertake surveying of the plots and produce updated layout plan.
- In case of relocation, compensation of affected plot owners should comply with Compensation Guidelines for Tribal Areas 2010 and The Environmental and Social Safeguard Policies of the World Bank Group.

11.2.6 Occupational Health and Safety

- All workers should have a standard uniform which includes overalls and safety boots to be allowed to do any form of work on site.

- Personal Protective Equipment (PPE) should be supplied to suit the work environment i.e
 - dust masks should be a standard for working in dusty conditions,
 - gloves should be supplied for lifting purposes,
 - ear plugs should be provided for noisy environments especially those that exceed 75 dB
 - safety goggles should be provided when undertaking activities hazardous to the eyes
 - safety harnesses should be provided for work on elevated heights such as elevated water tanks.
- Safety toolbox talks should be conducted weekly, and a record of minutes should be kept and produced when required

11.2.7 COVID-19-Protocols

The Contractor should obey all the COVID-19 Protocols which are as follows:

- All persons on site shall wear a face mask or homemade item that covers the nose and mouth.
- Provide clean water, soap and sanitisers, to allow for frequent washing of hands.
- A register for recording names, temperatures, and time.
- Purchase infrared thermometer to take temperatures.
- Avoid direct contact with anyone with cold or flu symptoms.
- Avoid handshakes, hugs and kisses when greeting each other.
- Cover the nose and mouth with a tissue or flexed elbow when sneezing or coughing.

12. FINANCIAL PROPOSAL

Table 73 which follows below presents a summary of cost the associated with the implementation of this ESMP. It is estimated that the mitigation measures at the pre and construction stages will cost a total of **P 6, 126, 395.00 (US\$ 612,639,50)** which is about 3 percent of the total sub-project cost.

Table 73: Estimated Budget for Implementation of the ESMP

	Activity	Time Frame	Budget (Pula) (US\$)	Responsibility	
1.	CAPACITY BUILDING				
	Capacity building of WUC officers in Environmental and Social Safeguards	Throughout project lifecycle	P200,000.00	WUC	
	Capacity building of Stakeholders involved in ESMP and GM implementation	Within first 3 months of project implementation	P200,000.00 <i>(Hiring of venues, stationary, resources for GM, food, sitting allowances for GRC and CLO stipend etc.)</i>	WUC	
	Capacity building/awareness raising of community and workers (i.e., GBV/Codes of conduct, regular consultations with community	At the beginning of the project and as and when necessary	P200,000.00	WUC	
2.	ESMP IMPLEMENTATION, MONITORING, EVALUATION AND REPORTING				
	Regular monitoring of Project site and activities and sitting allowance for GM (including GM for VCP)	Entire project period, of 12 months and defect liability of 12 months – monthly	P969, 450.00 <i>(Monitoring by(Project Liaison Officers)</i>	WUC <i>(part pre-funded by engagement of environmental/social consultants)</i>	
	ESMP implementation of mitigation measures including VCP. Project initiation, project implementation, project meetings and post project and close out	Before and during construction	P3, 950, 000.00	To be borne by the appointed Contractor.	
	GM Implementation Allowances for GRC Members Monthly Stipends for Community Liaison Officers GM Publicity Material and Stationery etc.	Before and during and post construction	P250,000.00	WUC and part Contractor	
	ESMP implementation of mitigation measures Funding for GBV mapping of services and inclusion of GBV, SEA, SH and VAC compliance team and modification of GM for GBV reporting HIV mitigation measures	During operations and maintenance annually	From WUC's regular operational costs	WUC	
	Sub-Total			P5, 769, 450.00	
	10 Percent Contingency			P 576,945.00	
	TOTAL			P6, 336, 395.00 (US\$ 633,639.50)	

13. STAKEHOLDER CONSULTATIONS

13.1 Stakeholder Engagement

According to The World Bank Standards and Social Safeguards it is obligatory for stakeholders to be consulted during the preparation of this environmental and social impact assessment (ESIA) studies and other environmental and social management tools (ESMF, ESMP, VCP, etc.) for the proposed project. The consultations undertaken for this study were with participants such as affected communities, local authorities, and stakeholders. In fulfillment of these standards' requirement, a public participation process aimed to achieve the following objectives:

- a) Identify vulnerable communities with attachment to land of the project area and engage them at relevant stages of the study.
- b) Consult with affected land-owners on the Resettlement Action Plan (RAP) for any possible resettlement risks and impacts.
- c) Solicit views and concerns from the interested and affected persons and organizations (both private and public) that help enhance the project designs, identify project risks, identify potential environmental and social impacts, and strengthen mitigations measures.
- d) Identify opportunities and constraints for project implementation using local knowledge.

13.1.1 Stakeholder Consultation Matrix

Stakeholder consultation aims to build relationships based on mutual trust and benefits. Listening to and understanding the views and feedback from stakeholders can help shape and improve the overall implementation of the project. The methods and results of consultation undertaken with the Interested and Affected Parties as well as the relevant institutional stakeholders are presented in the following section. **Table 74** below presents the stakeholders consulted and the reason for their involvement in the sub-project).

Table 74: Stakeholders Consulted

Stakeholder Groups and Names	Interest at Stake (in relation to the proposed project)	Effect of the project on the Interest +ve, 0 (neutral), -ve			Importance of the Stakeholder to the success of the project	Degree of Influence of the Stakeholder over the project	Comment	
		+ve	0 (neutral)	-ve			Importance (Needs, Expectations and Issues)	Influence (Power over and within project)
					U = Unknown	U = Unknown		
					1 = little/no importance	1 = little/no influence		
					2 = some importance	2 = some influence		
					3 = moderate importance	3 = moderate influence		
					4 = high importance	4 = high influence		
		+ve	0 (neutral)	-ve	5 = critical player	5 = critical player		
Local Authorities								
Village leaders, Village Development Committee (VDC), and the community through Kgotla meetings	Positioned to advise on the village planning implications of the proposed project. Responsible for all village development matters and coordinates all village institutions' activities	+ve			4	4	Shortage of water is an issue that has affected both village leaders and the community	Influence over their communities to support or reject the project and even revolt against it. Village authorities are respected on many village issues and sometimes never questioned.
Directly affected communities								
Residents in close proximity to the project area		+ve			4	4	Directly affected by the negative impacts of the proposed project e.g. noise and dust	Their views and opinions about the proposed project matter for the endorsement of the project

Other Interested Parties (Service Providers)									
Tutume Health Team	Sub-District Management	Encourages managers to take charge and make decisions about health services and the allocated resources.			-ve	3	3	The project is expected to conform to the District Health Plans that aim to curb the spread of communicable diseases amongst workers and the community at large.	They can order the project to a halt whilst dealing with a disease breakout.
Tutume Council – Department of Education	Sub-District	Exists to interpret education policies, design, develop, evaluate, and ensure prompt delivery of quality education to learners from pre-primary to secondary education level			-ve	3	3	Provision of educational records: enrolment, and pass rate for the project villages	They may be asked to provide any information concerning educational facilities in the project villages
Social Welfare Office		Provide guidance on what would maximize benefits and ameliorate negative impacts			+ve	3	3	Maximizing the social benefits of development to communities they serve	Non-cooperation which could potentially lead fewer benefits being realised by local communities
Department of Forestry and Range Resources		Protection of IUCN Red List category vegetation			-ve	4	4	Provide guidance on where plants are located and how they can be protected from project related damage	Non-cooperation which could potentially result in fewer plants being located and protected
Department of Wildlife and National Parks		Protection of wildlife			-ve	4	4	Provide guidance on how wildlife can be protected from project related impacts	Non-cooperation which could potentially lead to delays

Nata Sub Land Board, Tutume Sub Land Board and Marapong Sub-Land Board	Land use			-ve	4	4	The stakeholder could assist with land use issues that would be encountered during project implementation	Non-cooperation which could potentially lead to delays
Sowa Town Council and Tutume Sub District Council	Developments in Sowa Town and the district			+ve	4	4	The stakeholder produces development plans for the area so they could provide vital input to ensure the project benefits are enhanced	Non-cooperation which could potentially lead to delays
Social and Community Development	Geared towards improving the socio-economic wellbeing of individuals, group's families, and communities through provision of safety nets, psychosocial support and capacity building to enhance quality of life			+ve	3	3	Maximizing the social benefits of development to communities they serve	Report delays due to lack of relevant socio-economic baseline data
Other Interested Parties: Non-Governmental Organisations (NGOs)								
Botswana Red Cross	Alleviation of human suffering by providing humanitarian services to most vulnerable communities	+ve			2	3	Focuses on uplifting the vulnerable members of the community and offering humanitarian services	Internationally connected to lobby for the protection of the vulnerable community members

Botswana Council of Women (BCW)	Provision of women with skills, knowledge and motivation to enable them to participate fully in the process of social and economic development	+ve		2	3	Promotion of full participation of women in the project activities, especially benefiting from employment opportunities during construction	National in scope and dependent on lobbying for empowerment of women mainly through development/amendment of policies
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13.1.2 Stakeholder analysis

The stakeholders indicated on **Table 75** have been identified through a stakeholder analysis process. The approach involved a systematic methodology of identifying all those who are directly affected by the project and those who may assist in the sub-project's implementation. A comprehensive process of engaging the public was followed with the aim to identify issues and concerns and to establish the effective working relations with the community and Local Authorities and any other parties that expressed interest in the proposed project. The IAPs were consulted to brief them about the impending project before commencement of public consultation meetings, which were held from 11th to 14th October 2021 (**Table 75**). This activity was also aimed to seek views, concerns, and perceptions about the proposed project.

Table 75: Schedule of Public Meetings

Date of Consultation	Purpose of Consultation	Date and Time
Kutamogoree	Kgotla Meeting with Village Leadership	15 September 2021, 0900 to 1000hrs
	Kgotla Meeting with the Community	11 October 2021, 0800hrs to 0945hrs
Moseetse	Kgotla meeting with Village Leadership	15 September 2021, 1200-1300hrs
	Kgotla Meeting with the Community	11 October 2021, 1200hrs to 1305hrs
Dukwi	Kgotla Meeting with Village Leadership	16 September 2021, 1500hrs to 1600hrs
	Kgotla Meeting with the Community	11 October 2021, 1500hrs to 1610hrs
Dukwi Refugee Camp	Interview with the Dukwi Refugee Camp Settlement Commandant	11 October 2021, 1630hrs to 1745hrs
Maposa	Kgotla Meeting and Interviews	17 September 2021, 0900hrs to 1000hrs
	Kgotla Meeting with the Community	12 October 2021, 1513hrs to 1650hrs
Manxotae	Kgotla Meeting with Village Leadership	18 September 2021, 1400hrs-1500hrs
	Kgotla Meeting with the Community	13 October 2021, 1200hrs to 1340hrs
Sepako	Kgotla Meeting with Village Leadership	17 September 2021, 1500hrs to 1600hrs
	Kgotla Meeting with the Community	13 October 2021, 0800hrs to 0930hrs
Nata	Kgotla Meeting with Village Leadership	18 September 2021, 0900hrs to 1000hrs
	Kgotla Meeting with the Community	14 October 2021, 0900hrs to 1020hrs

Stakeholder analysis is a methodology often used to incorporate the needs of those who have an interest in the proposed developmental interventions such as the envisaged Sowa Water Supply Scheme. This is to ensure that the interventions are accommodative, realistic and sustainable. Consequently, a stakeholder analysis was undertaken to identify the various stakeholders that are likely to be affected by and/or have interest in the proposed development. At a high level, the stakeholder analysis has identified two broad categories of stakeholders namely:

1. **Affected Parties** - those who are affected either positively or negatively by the proposed development (Kutamogoree, Moseetse, Dukwi, Dukwi Refugee Camp, Nata, Maposa, Sepako, Manxotae, Sowa Town and BotAsh Mine).
2. **Interested Parties** - these are those who albeit not affected by the project but nonetheless have interest in the project. They form part of the broader community i.e. Local Authorities.

13.1.3 Approach

- Project Information Dissemination

Appointments with the respective *Dikgosi* were made and confirmed through telephone calls.

- Methods of Engagement

Kgotla meetings, and focus group discussions were held with Dikgosi and VDC members at different dates and times to solicit views about the proposed project

13.2 Data Analysis for Field Surveys for the Proposed Sowa Water Supply Scheme Project

13.2.1 Methodology

This study draws from a more comprehensive qualitative and quantitative study undertaken among the project community. As the Environmental Social Impact Assessment (ESIA) study was intended to understand experiences and perceptions. Semi-structured questionnaires, interviews and focus group discussions were used to collect data. The use of these two data collection methods was considered to compensate for each method's individual limitations and strengthen their advantages as well. These two methods allowed for the collection of detailed data and stories that gave a detailed view of project area communities.

The data analysis followed the appropriate analysis procedures. Excel was used in the data analysis process.

13.2.2 Summary of Issues and Concerns

Table 76: Issues Raised During Consultations

Date	Village	Summary of Issues Raised
11.10.2021	Kutamogoree	<ul style="list-style-type: none"> • There is water shortage in Kutamogoree. • Saline water which poses a health concern. • The community would like to drink treated water like people in towns and cities, otherwise seek other alternatives like connecting a pipeline from Ntimbale Dam. • Backfill trenches and borrow pits to avoid injury to livestock. • Proper and safe disposal of oil from machinery to prevent contamination. • Centralised positioning of elevated Water tanks for easy and cheaper connections into households. • Currently have 6 standpipes, only 2 are operational, with low pressure though. • Community is pro-job creation and requested that they be made a priority before engaging other people. Hiring should be transparent and conducted at the kgotla.
11.10.2021	Mosetse	<ul style="list-style-type: none"> • There is water inadequacy in the village. The water has a 'salty' taste. • Will the current number of boreholes be enough to stabilise the problem in the village? Response: The tests have shown that there is enough yield from the current boreholes. • The water pipes get "clogged" and result in pressure build up and eventually pipe bursts. • In terms of moral decay, GBV and family break ups, it is up to everyone to behave well and stand against every form of social ill. • There is only 1 standpipe in Mosetse that is not in a good working condition.
11.10.2021	Dukwi	<ul style="list-style-type: none"> • Experiencing water shortages; pipes are as old as 1994. This shortage affects learning at school as learners have to queue for water for long hours instead of attending evening study. • The little water they have in the village is saline (salty) and not good for their daily consumption. It damages appliances, geysers, and water kettles. Clothes lose colour and wear off quickly. • Stop use of pit latrines as they contaminate underground water. • 3 functional standpipes, the rest have been demolished. They pleaded for WUC to reconnect them. • There is an unfenced dumping site in the village. • Issue of concern; will the new pipes branch out into households for water distribution. • Water treatment / purification should be a priority.
11.10.2021	Dukwi camp	<ul style="list-style-type: none"> • Settlement commandant asked why Lepashe village is not part of the study since it has the highest concentration of Basarwa as compared to the other villages. • Water supply has always been free in the camp for refugee community. Those with the means have always been allowed to connect directly to their houses.

Date	Village	Summary of Issues Raised
		<ul style="list-style-type: none"> • The 1957 refugee Act is very old, it does not speak to today's issues. • The camp has 18 nationalities with a population of around 1300. Children being the majority. • The current group does not circumscribe to what our national legislation terms a refugee because our act was designed to define a political refugee. • Problem is that there is no clear map which shows where pipes pass. • The water is saline. It damages appliances.
12.10.2021	Maposa	<ul style="list-style-type: none"> • Elated about job creation opportunities; advised that it should be transparent and inclusive of all. Hiring should be conducted at the main kgotla. • Recruiting team should source local qualified labour before bringing their own. Priority must be to the community. • Follow the minimum wage policy. • Village has 7 standpipes, 4 are in operation while 3 have been damaged by livestock. The damaged standpipes are in the outskirts of the village. • Pipes should not encroach into households, if they do, WUC should be ready to compensate accordingly. • The water is saline. Leaves residues and later damages electrical appliances. They fear for their health. • For safety reasons, standpipes be on the same side as households, to avoid movement across the road when fetching water which may result in car accidents. • Provide right channels for dispute (grievances) resolution caused by low wages. • Set up JoJo tanks prior to project commencement to curb water shortages when old pipes are replaced. • VDC should be consulted prior to sourcing of earth materials, not individuals in the community.
13.10.2021	Manxotae	<ul style="list-style-type: none"> • Welcomed the development proposal and excited about job creation. Recruitment should be done at the kgotla and inclusive of both genders. • Lack of clean treated water is a critical issue. • There are 5 standpipes, one is fully operational. • They are Basarwa hence a vulnerable community. They look forward to implementation of VCP. Requested that the area social worker be engaged in the plan. • Suggested that instead of pipes running through to Nata, they should tee off into their village at the Nata-Manxotae junction which could reduce costs. • The community expects good conduct from Contractors, and they should strictly be in their village as per the contract terms and conditions. • Payments should be in full and on time. • GBV is a serious issue of concern in the village. There are high cases of GBV in Manxotae. • Consult with the village leadership on issues affecting the environment e.g., veldt product harvesting. • Another community member raised a question, he wanted to know what would be done if the fields/homesteads/private

Date	Village	Summary of Issues Raised
		<p>property are near the site, so that the project is not disturbed- There must be common understanding when compensating those affected. Rates should be fair and according to legislation. Response: Consultations will be undertaken with the land board to identify owners of the field so that we map a way forward for the project to continue. The World Bank has a framework to follow concerning relocations. Relocations will be done and the affected people will be compensated in totality following the requirement of the Compensation Act.</p> <ul style="list-style-type: none"> • Corporate Social Responsibility. A bigger clinic is needed in the village.
13.10.2021	Sepako	<ul style="list-style-type: none"> • What will be the depth of the trenches for laying the pipe? Please lay the pipes deeper because elephants easily damage shallow pipes. • Recruitment should be fair to both genders and done at the village kgotla. • Damaged private property should be compensated accordingly. • The main road divides the village into 2, how are pipes going to branch into the other side of the village where they currently do not have standpipes? • Village has 10 standpipes only 4 are still working. • They have a landfill, though not fenced. • Kindly request they be built a dam. • Suggested that pipes should branch off at the Nata-Manxotae junction, that way maybe pressure would not be low.
14.10.2021	Nata	<ul style="list-style-type: none"> • It has been years consuming saline water, it discolours teeth and clothes. It is not good for our health. • Contract terms should stipulate fines for those who terminate employment before contract completion. • Serious water shortage in the area. • VDC should be custodians of standpipes. • Reconnect standpipes, it helps those who cannot connect water to their yards. • As part of the corporate social responsibility, can't World Bank build them a clinic or maybe construct internal road to the kgotla. • Make permanent route markers where pipes pass.

13.3 Stakeholder Engagement Plan

Stakeholders will continue to be engaged and consulted on different issues as per schedules of **Tables 77** and **78** respectively.

Table 77: Stakeholder Engagement Plan

Phase	Activities	Institution Responsible	Dates
Pre-construction	Inform community of commencement of project works	WUC (E&S Specialists)/PLO	2 weeks before the Contractor comes to site
	Community input on selection and choice of Contractor site office, any access roads if needed, etc.	Contractor/PLO/CLO	3 weeks before Contactor moves to site
	Appointment of Community Liaison Officer	WUC (E&S Specialists)/PLO/Kgotla	4 weeks before appointment of officer introduction of officer should be done 1 week after appointment
	Development of the GBV Action Plan and mapping of services	WUC GBV Specialist/Gender Dept (and NGOs) and WUC E&S Specialists	3 weeks before construction starts
	Awareness talks on the GM process	WUC (E&S Specialists) /PLO/CLO/Kgotla	2 weeks after the Community Liaison Officer is appointment
	Procurement of local labour	WUC/Contractor	Should be 4 weeks before selection process and 4 weeks before application deadline
Construction	Educational talks on GBV, SEA, SH and VAC; HIV AIDs, COVID-19 Protocols and community consent	WUC E&S Specialists (and NGOs working on GBV)/CLO/PLO	2 weeks before training and sensitization is to take place.
	Update on progress of the project and implementation of VCP	PLO/CLO	Once a month and additional meetings related to urgent issues
Decommissioning (post construction)	Discuss how community can communicate with the project following decommissioning and feedback from the community on the project implementation	WUC (District Officer and E&S Specialists)	At the start of decommissioning WUC to capture meeting in minutes and produce report (for WB) and leave a copy with Kgosi's office/VDC

Table 78: Consultations with NGOs and Government Institutions

Phase	Activities	Institution Responsible	Dates
Pre-construction	After award of contract – update on project start	WUC (District Officers and E&S Safeguards)/PLO	2 weeks before the Contractor comes to site
	Selection of Contractor site office	Boteti Land Board, Boteti Sub-District Council	2.5weeks before contactor moves to site
	Use and existence of GM	WUC (District Officers and E&S Safeguards)/PLO/CLO	
	Procurement of Labour	Kgotla, VDC	Should be 4 weeks before selection process and 4 weeks before application deadline
Construction	GBV/SEA/SH/VAC, HIV/AIDs, COVID-19 Protocols	NGOs such as Tebelopele for HIV AIDs, Gender Links GIDA, The local Health Post Department of Gender Affairs Local Enterprise Authorities (LEA) – and Service Providers	Around the start of construction and once a month during construction) or as agreed with NGOs
	Update policing on project, solicit feedback from policing services and Min. of Youth, Culture and Sport	WUC (District Officers and E&S Safeguards)/PLO/CLO	Once a month (pre-construction kick off meeting 2 weeks prior to construction and once a month thereafter or as agreed with NGOs
	Basarwa NGOs (Khwedom Council) to update on project activities, status	WUC PIU (Coordinator, E&S Specialists)/PLO/CLO/Kgosi	Once a month or as agreed to with NGOs

14. GRIEVANCE MECHANISM (GM)

14.1 Introduction

A Grievance Mechanism (GM) is necessary for addressing the concerns of Project Affected People and other stakeholders. It is anticipated that some of these grievances may include eligibility criteria, compensation entitlements for loss of livelihood and use of land.

The mechanism for grievance redress includes:

- Provision for the establishment of a Grievance Redress Committee (see GRC members below).
- Multiple grievance uptake locations and multiple channels for receiving grievances.
- Fixed service standards for grievance resolution, include adjudication process and process of handling situations related to gender-based violence/sexual exploitation and abuse
- Prompt and clear processing guidelines (including reviewing procedures and monitoring system).
- A timeframe for responding to grievances.
- A reliable and effective reporting and recording system.
- Procedure for assessing the grievance.
- Grievance escalation process.

The GM is designed with the objective of solving disputes at the earliest possible time before they escalate. In addition, World Bank OP 4.12 emphasizes that the PAPs should be heard and as such, they must have access to a fair, transparent and accessible means to address their concerns and views related to the project. Furthermore, the mechanism should be effective in addressing projects at project-level so that grievances are not referred through the court system for resolution, especially since the court system may not be financially accessible to all and may add cost and time burdens.

14.1.1 General Principles and Key Aspects of the GM

The sub-project has put in place an extra-judicial mechanism for the management of grievances and disputes. The VCs will be able to trigger this mechanism, while still being able to resort to the judicial system.

Key aspects of the GM are:

- The community including VCs need to be informed about the grievance mechanism and how they can make use of this process.
- Grievances will be recorded using a Grievance Form (in local language, also available in English). Grievance Forms will contain details regarding the grievance as well as the name and address of the applicant, application date, type of application and the name of the persons receiving the grievance. The forms will be logged in a register where they will be tracked through to a suitable resolution.
- The complainant will receive notification that their grievance has been received (if complainant is known) in writing.
- Grievance monitoring log (which includes actions taken, corrective measures, see **Annex 14**).
- Closure sheet, copy of which will be handed to the complainant after he/she has agreed to the resolution and signed off.

- The PIU will maintain a digital grievance database, containing the logs and records of all grievances received, with an indication of the respective status of a grievance (i.e. resolved, not resolved, pending, etc.), in addition to a hard copy.
- Resolution options will be developed through unilateral proposal, bilateral discussion and/or third party mediation. If a complaint is not legitimate the case will be closed without agreement with the complainant. Any response will be communicated clearly either orally or in writing, and a grievance case will only be closed when an agreement with the complainant is reached.
- Community members including VCs will have access to third party legal advice, through referral to Botswana Legal Aid, at no cost. Information on access to legal advice will be communicated to the affected people

14.1.2 Management Functions and Responsibilities

During the implementation phase of the sub-project, the mechanism for grievance redress shall include:

- Provision for the establishment of a grievance redresses committee with a sitting allowance budgeted for the Grievance Redress Committee (GRC) members.
- Multiple grievance uptake locations and multiple channels for receiving grievances (project hotline, project website, Facebook page, WhatsApp blasts, PIU office, Kgosi and VDC, grievance box at the Kgotla).
- Fixed service standards for grievance resolution which include adjudication process.
- Prompt and clear processing guidelines: including reviewing procedures and monitoring system (see flow chart).
- A timeframe for responding to grievances (see flow chart on GM chapter).
- A reliable and effective reporting and recording system (grievance register, complaints logbook – hard copy).
- Procedure for assessing and responding to the grievance.

14.2 Responsibilities for Implementing Stakeholder Engagement Activities

14.2.1 Roles and Responsibilities

The PIU in consultation with the respective community will appoint Community Liaison Officers (CLOs) in project area villages/settlements where there are project works, to conduct stakeholder outreach during project implementation and respond to any grievances or complaints that may arise. The CLOs will act as key points of contact to bring project grievances from PAPs, stakeholders, construction workers, residents, and community members to the Grievance Redress Committee (GRC). They will liaise with the WUC Safeguards Team to inform them of all complaints and outcomes. The CLO will contact the PIU Safeguards Team in case a complaint is not resolved within two weeks after receiving the alert. The PIU safeguards team will go to the field in order to obtain further information and resubmit the case to the GRC. The complainant will be notified that further information is being collected and kept informed about the status.

a. Community Liaison Officers (CLOs)

The PIU will in consultation with respective communities appoint Community Liaison Officers (CLO) in the specific sub-project areas. The CLOs will be situated in the project area villages/settlements where there are project works, will be designated to receive, review, record and address project related complaints. Every two weeks, CLO will consolidate complaints and submit to the GRC. Their contact information will be published and communicated via public announcements and information

sharing about the project, (radio, television and newspapers, community meetings, etc.), to conduct stakeholder outreach during project implementation and respond to any grievances or complaints that may arise.

Key functions of the CLOs are:

- Create awareness on the existence of the project and Grievance Mechanism.
- Act as the key point of contact to bring project grievances from project affected people, construction workers, local residents, and community members to the GRC.
- Register the grievance/complaints on the Grievance Logbook and acknowledge receipt within 5 days.
- Respond back to the beneficiary's queries/complaints lodged, giving their status and/or their outcome if they had been resolved.
- Ensure that all queries/complaints from beneficiaries have been formally recorded following the existing procedures.
- Review and evaluate grievances/complaints and ensure that complainant is given feedback within 14 days.
- Conduct community consultations to provide inputs into the GM
- Facilitate communication which are in the form of reports to PIU and Project Contractor and distribution of information, education and communication material to the community including VCs.
- Represent the project during Kgotla meetings.
- Represent the interests of vulnerable individuals and groups following consultations with them to better understand their concerns and issues, and keep notes and records of such meetings.
- The CLOs will be responsible for making sure the recommendations of the GRC are implemented and advising WUC PIU during ESMP and RAP implementation, and Contractors to make any appropriate adjustments to their works.
- Work closely with the WUC Principal Sociologist and Environmental Officer and flag any issues of concern as well as report incidents as they occur.
- If a concern of a highly sensitive nature is raised such as gender based violence (GBV) or Sexual Harassment Exploitation and Abuse (SHEA), VACs, the CLO shall invoke the special procedures related to GBV, SEA, SH and VAC/VACs and will ensure the anonymity and confidentiality of the survivor. See **Figure 24** for special procedures.

In addition to the CLO, the project will make available grievance forms in every settlement (at the Kgotla office) as an accessible venue for filing a grievance and a Grievance Box. In collaboration with the communication and IT team for the project, the WUC telephone hotline and website will also be available to receive complaints anonymously or they can identify themselves. Every two weeks, the CLOs will collect forms filled out to submit them to the GRC and record them in the grievance logbook.

The PIU Safeguards Team will work closely with the WUC communication and IT Team, who will oversee compiling complaints received on social media, website and WUC hotline. A meeting will be held at least one time per month to review complaints and submit them to the GRC. For illiterate persons, CLOs will assist them to write and submit complaints. To be sure that the adequate confidentiality will be kept, the Project will issue a code of conduct to be signed by the VDC and community liaison officers.

b. The Grievances Redress Committee (GRC)

The GRC will be responsible for receiving and resolving in a fair, objective, effectively, timely and accountable manner all concerns or complaints raised by project affected persons (PAPs) in the communities during all phases of the project lifecycle.

c. Composition and Membership of the Grievance Resolution Committee (GRC)

The GRC will meet as and when required, at least once per month.

The complaints will be submitted to the Project Grievance Redress Committee (GRC).

It will be created with a clear term of reference (TOR) and will reflect the principles, expected behaviors, responsibilities, and duties as outlined in this GM.

Specific GM for conflict prevention and resolution at the project level has been devised in consultation with the affected communities, including Vulnerable Communities and has received their broad community support. In projects where there are Vulnerable Communities, there will be at least one VC on the GRC as agreed with the VC during consultations.

The GRC, shall maintain all records from complaint to final decisions made by the GRC for future reference, with an accurate and up to date grievance logbook (the PLO is to ensure the logbook is accurate and ensure they have a copy of updates to the logbook). The GRC shall also ensure that public participation and consultation is always a part of the process to promote understanding, transparency, trust in the project, accountability and mitigate against unnecessary complaints and disputes. The Chairmanship of the GRC will rotate amongst the Committee Members depending on the issues to be considered by the Committee.

The GRC Members include:

- Project Contractor
- Land Board Representative
- Water Utilities Corporation (WUC) Representative
- Two Local Representatives (One being male and the other female; and in Vulnerable Communities, at least one representative being a member of the VC)
- Project Liaison Officer 1 (Safeguards Social Development Consultant)
- Environmental Officer 2 (Safeguards Environmental Consultant)
- Community Liaison Officer (Secretary)
- NGO representing Basarwa (e.g. Kwedom Council, San Youth Network)

The PIU Safeguards Team Members will attend meetings when there is a matter that requires their urgent attention.

The broad responsibilities of the GRC include:

- Publicizing the grievance management procedures
- Receiving, reviewing, investigating and keeping track of grievances referred to them by the CLO
- Adjudicating grievances
- Monitoring and evaluating the fulfilment of agreements achieved through the grievance redress mechanism.

d. Project Liaison Officers (PLOs)

The Project Liaison Officers (PLOs) - the environmental and social safeguard monitoring consultants for the project will be tasked. Their contact information will be published and communicated via public announcements and information sharing about the project, (radio, television and newspapers, community meetings, etc.), to conduct stakeholder outreach during project implementation and respond to any grievances or complaints that may arise.

Key functions of the PLOs include:

- Attend to households issues regarding the reconstruction works and facilitate the liaison between the beneficiary (households), local communities (community buildings) and the project team.
- Ensure prompt communication of concerns and issues about the project to the project team (not the Contractors).
- Assist the project communication team with all communication matters and to provide feedback on the effectiveness of the messages and means of communication used.
- Assist project team to arrange meetings and location of meeting for any consultation with the community.
- Monitor the implementation of the ESMP and report progress at Onsite Project Progress meetings.

e. The Contractor

During the implementation, Contractors shall work in line with the World Bank standards on Environmental, Social, Health and Safety (ESHS) and Occupational Health and Safety (OHS) in the workplace and on their relationship with affected communities. The application of these Codes of Conduct (CoC) will help ensure the project meets its ESHS and OHS objectives, as well as preventing and/or mitigating the risks of GBV, SEA, SH and VAC on the project and in the local communities. Contractors should make sure these CoC are adopted by those working on the project and facilitate in every manner (e.g. staffing, management support, monitoring and financial etc.) the attainment of CoC's aims, namely to:

- Create awareness of the ESHS and OHS expectations on the project.
- Create common awareness about GBV, SEA, SH and VAC and ensure a shared understanding that they have no place in the project
- Create a clear system for identifying, responding to, and sanctioning GBV, SEA, SH and VAC incidents

Three CoC must be adhered to in this project (full Codes are in **Annexes 7, 8 and 9**):

- Company Code of Conduct:** Commits the company to addressing GBV, SEA, SH and VAC issues;
- Manager's Code of Conduct:** Commits managers to implementing the Company Code of Conduct, as well as those signed by individuals; and,
- Individual Code of Conduct:** Code of Conduct for everyone working on the project, including managers.

These codes of conduct will be translated into a language understood by the labour force, explained and displayed in the work sites, workers and affected communities will be sensitized prior to works

start. The company liaison officer will work closely with PIU safeguards team to bring to the GRC all complaints and special cases which affect the Codes of conduct.

For issues regarding GBV, SEA, SH and VAC, the Response Protocol which is the mechanisms set in place to respond to cases of GBV, SEA, SH and VAC will be implemented. By doing that, the Contractor will first establish a 'GBV, SEA, SH and VAC Compliance Team' (GCCT).

The GCCT will include, as appropriate to the project, at least four representatives ('Focal Points') as follows:

1. A safeguards specialist from the WUC.
2. The OHS Manager from the Contractor (or someone else tasked with the responsibility for addressing GBV, SEA, SH and VAC on the Contractors side) with the time and seniority to devote to the position.
3. The Project Liaison Officer (PLO and also known as the supervision consultant); and,
4. A Social Worker with experience in Sexual Harassment, Exploitation and Abuse (SHEA), including Gender - Based Violence (GBV) and Violence Against Children (VACs) GBV, SEA, SH and VAC (the 'Service Provider').

14.3 Community Level Grievance Mechanism

Local communities have existing traditional and cultural grievance redress mechanisms. It is expected that some disputes at the community level may be resolved using these mechanisms, without the involvement of the Project, Contractor(s), and or Government representatives at local and national level. The extended family, settlement and/or Kgosi may be involved at this level. This may be more suitable for issues and concerns that are minor. For example, if the Contractor needs to recruit housekeepers or other human resource needs, he or she can choose among the resumes collected by the community. The community and Contractor will be informed that the principle of non-discrimination and fairness as per the Botswanan Labor Law will apply in the selection. Also, if the company wants to compensate the community for using their sand, gravel or because of the impact of its activity (dust dispersion), those grievances can be solved at the community level, without the GRC, if the community so chooses.

14.4 Project Level Grievance Redress Mechanism

Many projects related grievances during the works are minor and site-specific. Often, they revolve around nuisances generated during construction such as noise, dust, vibration, workers disputes, etc. They can be resolved easily on site. However, regarding disputes that include differences between households over land, or boundaries, even on issues triggered indirectly by the Project during its lifecycle, the GM will have a body, the GRC to address disputes.

Other issues that are potential grievances may involve access to property arrangements, or sexual harassment, exploitation and abuse (SHEA), including Gender - Based Violence (GBV) and Violence Against Children (VACs) of workers Contractors and/or community members during construction phase. Most of these cannot be resolved immediately and on site and in the case of GBV, require specific interventions and processes to protect the safety, well-being and identity of survivors.

14.5 GM Procedures

The community will be informed and sensitized about the use of an existence of the GM (through radio notices, TV, community meetings, community signage, Kgotla, CLOs, PLOs) of the various uptake

options where complaints can be submitted. The PIU Safeguards Team will meet every two weeks with the communication and IT team to review all complaints from social media, websites and hotline and inform the complainants within three days those complaints have been received and the procedures they must follow.

The PIU Safeguards Team will then organize a meeting for the GRC to meet at the soonest to ensure compliance with the timeline for responses to complainants.

If the identity of the person who submitted a grievance is known, the GRC must inform them within three days of the decision or when a decision is to be expected. The date of this outreach is to also be logged into the grievance log. The GM will commit decisions to be finalized within two weeks of date of receipt and complainants will be notified and will record the complainant's comments about the decision. If the complainant is not satisfied, they will be notified about escalation procedures.

Notices and signage will be erected at all sites providing the public information on the Project and summarising the GM process, including contact details of the relevant Community Liaison Officer. All complainants should be free to lodge a complaint in one or as many of the uptake stations noted above.

A Complaints Register (or Grievance Log) will be at the PIU Safeguards Office and village/settlement Kgotla office with CLOs, but also with Contractors, who will log the: i) details and nature of the complaint (include categorization of sensitive/urgent, non-sensitive); ii) the complainant name and their contact details if known; iii) date the complaint was received; iv) corrective actions taken in response to the complaint; v) the date the response was made available to the community and the complainant; vi) the resolution; vii) the response of the complainant if response was acceptable to them or not; viii) the name of the person who received the complaint and location/method the complaint was lodged. This information will be included in WUC Safeguards Team progress reports to the World Bank. See **Annexes 3 and 14**) for example of grievance log. The CLOs are responsible for ensuring that they collect all grievances so that they can update the PIU logbook and their logbook.

14.6 The Grievance Redress Structure

The structure or steps of the grievance mechanism includes:

- Multiple and accessible uptake stations to receive complaints (text, phone number, project website, mailing address, grievance box, others, communication to CLO, VDC, Kgosi) and account for vulnerable or disadvantaged individuals (persons with disabilities, elderly, illiterate, lack access to phone/computer, etc)
- Receive, register, and acknowledge complaint in logbook
- Screen and establish the foundation of the grievance
- Implement and monitor decisions
- Notify complainant of outcome and obtain feedback on acceptability
- If grievance is not escalated, conclusion to redress grievance and note in logbook
- Advise for a judicial proceedings as last resort if necessary
- Document the experience for future reference
- Notify the community (community boards, on project website, CLO, community meetings) about various complaints and outcomes without naming names)

A step-by-step process, with duration of each stage from the reception of the complaint to the notification of the resolution, with suggested timeframe and responsibilities is indicated in **Figure 28**.

14.7 Grievance Redress Process

The steps of the grievance mechanism consist of:

- The Aggrieved Party (AP) will take his/her grievance to the CLO who will endeavour to resolve it immediately.
- Where AP is not satisfied, the CLO will refer the grievance to the GRC.
- Receive, register and acknowledge complaint.
- Screen and establish the foundation of the grievance.
- Implement and monitor redress action.
- Notify the complainant of the result and obtain a response if the resolution is satisfactory. If not, inform the complainant of escalation process.
- Advise for judicial proceedings as last resort if necessary
- Document the experience for future reference.

Where the traditional and administrative procedures fail to resolve disputes, the aggrieved party has the right to take the matter to the courts in accordance with the Constitution of Botswana, other national laws, and the Lenders' policies.

The process is highlighted in **Table 79** with suggested timeframe and responsibilities.

Table 79: Grievance Mechanism Special Procedures

1.	Receipt of Complaint	Document date of receipt, name of complainant, nature of complaint	1 day	CLO (Community Liaison Officer)
2.	Acknowledgement of Grievance	By letter, email, phone	1-5 days	CLO
3.	Screen and establish the foundation / merit of the grievance	Visit the site; listen to the complainant/community; assess the merit	7-14 days	GRC members including the CLO, complainant, and his/her representative
4.	Implement and Monitor a Redress Action	Where complaint is justified, identify and carry out the redress	21-30 days or at a time specified in writing to the complainant	CLOs, WUC Social and Environmental Safeguard Specialists to coordinate the implementation of redress action
5	Inform Complainant and Community (use of community boards, newspaper, radio, what's app group, Facebook page) to inform community of grievance outcome and solicit response from complainant if claim has been fully addressed or not.	Where complainant is not satisfied, inform complainant of escalation process. If satisfied or not, ensure grievance logbook is updated.	1-2 days after deciding on a grievance by the GRC	CLO
6	Escalation of Grievance	Where complainant is not satisfied, inform complainant of escalation process to the	14-30 days	WUC PIU

		Project Steering Committee (PSC).		
8.	Funding of Grievance Process	WUC will refer the complaint to Legal AID, a Government Institution that assists people with low-socio economic status with legal redress, court process	No fixed time	Complainant

14.7.1 Escalation of Grievances

If the complaint is not resolved to the satisfaction of the aggrieved party by the Grievance Redress Committee (GRC), it will then be referred by the PIU Project Coordinator or to the Project Steering Committee (PSC).

The Project Steering Committee (PSC) will be composed of:

- CEO – WUC
- Technical Services Director
- Water Resources Director
- Chief Financial Officer
- Senior Manager – Supply Chain
- Controls Coordinator
- Corporation Secretary
- Project Coordinator
- Project Planner

The NSC will meet when required to address escalated grievances and will be required to address the concern within 30 days. Should measures taken by the National Steering Committee fail to satisfy the complainant, the aggrieved party is free to take his/her grievance to the Botswana judicial courts.

14.8 Judiciary Level Grievance Redress Mechanism

The project level GM process will not impede affected persons' access to the legal system. At any time, the complainant may take the matter to the appropriate legal or judicial authority as per the laws of Botswana. However, the quality and effectiveness of the judicial system should be assessed, as well as issues related to accessibility and affordability.

14.9 For sensitive issues regarding Gender Based Violence, Sexual Harassment or Violence Against Children

The Potential Procedures for Addressing GBV, SEA, SH and VAC are in **Annex 6**.

An exceptional or *ad hoc* meeting will be called the day after receiving this information. The GC, the National Steering Committee, the Contractor, and local authorities of the locality where this issue occurs will all meet as a plenary. At all times, the approach for such issues will follow a survivor-centred

approach and the anonymity of the survivor will remain intact. In addition, the survivor will have been informed of options such as receiving psycho-social support, medical assistance and other services as required.

For those issues, the mechanisms set in place to respond to cases of GBV, SEA, SH, and VAC will be implemented. By doing so, the contractor will first establish a 'GBV, SEA, SH and VAC Compliance Team' (SSVCT). The SSVCT will include, as appropriate to the project, at least four representatives ('Focal Points') as follows:

- Community Liaison Officer (CLO)
- Occupational health and safety manager from the Contractor, or someone else tasked with the responsibility for addressing GBV, SEA, SH, and VAC with the time and seniority to devote to the position
- Supervision Consultant (PLO)
- Social Worker
- Police Officer

14.10 Capacity of Local Institutions to Address Grievances and Disputes

- *Village Settlement Development Committee*: The settlement parliament has the responsibility to monitor developmental projects in their settlement. The interest of the community are their priority as per their mandate.
- *Kgosi*: The settlement tribal leader and is also an ex-offio member of the Settlement Development Committee and is a key figure in mediating among community members.
- *Project Resident Engineer (RE)*: As the head of the project, the Project Resident Engineer is responsible for ensuring that it is implemented smoothly.
- *Supervising Project Engineer*: Ensures that The Project Resident Engineer and ESIA Consultants are implementing the project as per their approved documents.
- *Project Liaison Officer (social and environmental safeguards monitors)*: Has a responsibility to ensure that all the ESIA/ESMP mitigation measures and plans are implemented accordingly.
- *Community Liaison Officer (CLO)*: Liaises btween the Project Officials/ Grievance Redress Committee and the Community. *Reports all grivances to the GRC.*
- *Grievance Redress Committee (GRC)*: Has a responsibility to ensure that all grievances are addressed timely and properly recorded.
- *Water Utilities Corporation (WUC)*: Has a responsibility to ensure that the objectives of the project are delivered as promised.

14.11 Good Communication and Information Sharing Practice

- Vulnerable and marginalized groups and individuals can report to the CLO who will be based at the settlement Kgotla.
- Can report by phone to CLO/Project RE.
- Can send an sms to the CLO/Project RE.
- There will be an accessible grievance/complaints boxes in community areas which will be checked daily. For those who cannot write, the CLOs will facilitate submission of a grievance and will be guided by an ethical code of conduct to respect the privacy of the complainant.
- There will also be a project email and website to enable usersto submittheir grievances anonymously.

- A WhatsApp Group will also be created for the community members who want to be informed on updates of the project.
- All complaints must be acknowledged for receipt regardless of whether they are anonymous or not. Community boards and the project website will list complaints that were submitted (without names) and will include expected date of response. Once the response is determined, the response with the original complaint will also be posted on the community boards and on the project website.
- There will be a specific person or persons who will be tasked to oversee the grievance process to ensure that all grievances are logged correctly and the GRC is notified.
- There will be specific training for the GRC and the CLO to ensure quality control of the GM process.

14.12 Monitoring

Annex 14 shows the grievance log that will be used to monitor and track the GM and which will be reviewed regularly for accuracy and compliance to the GM process. The logbook and at times, correspondence between the Contractor and PLOs in addressing grievances will also be reviewed by World Bank safeguards specialists undertaking project supervision.

14.13 ESTIMATED COST OF GM IMPLEMENTATION

The detailed cost of implementing the GM is presented below in **Table 80**. This cost has already been included in the overall costing of the ESMP as presented in **Table 80**.

Table 80: Costing of the GM Implementation

No.	Activity	Time Frame	Budget (Pula)/USD	Responsibility
GM Implementation and Monitoring				
	Allowances for GRC Members outside WUC and project employ.	Throughout the Project	(P500.00 per sitting) x Members x Once month x 30 months x 9 P135,000.00 (USD13,500.00)	WUC
	Monthly Stipends for Community Liaison Officers	Throughout the Project	(P600.00 per month) x 8 villages (2 @ VC settlements) x 15 months P90,000.00 (USD9000.00)	WUC
	GM Publicity Material and Stationery	Throughout the Project	P200,000.00 (USD 20,000.00)	WUC
	Capacity building and awareness for all representatives on GM as well as the community	Throughout the Project	P400,000.00 (USD 40,000.00)	Contractor
	Sub Total		P 825,000.00	
	15 percent contingency		P 123,750.00	
	Total		P 837,375.00 (US\$ 83,737.50)	

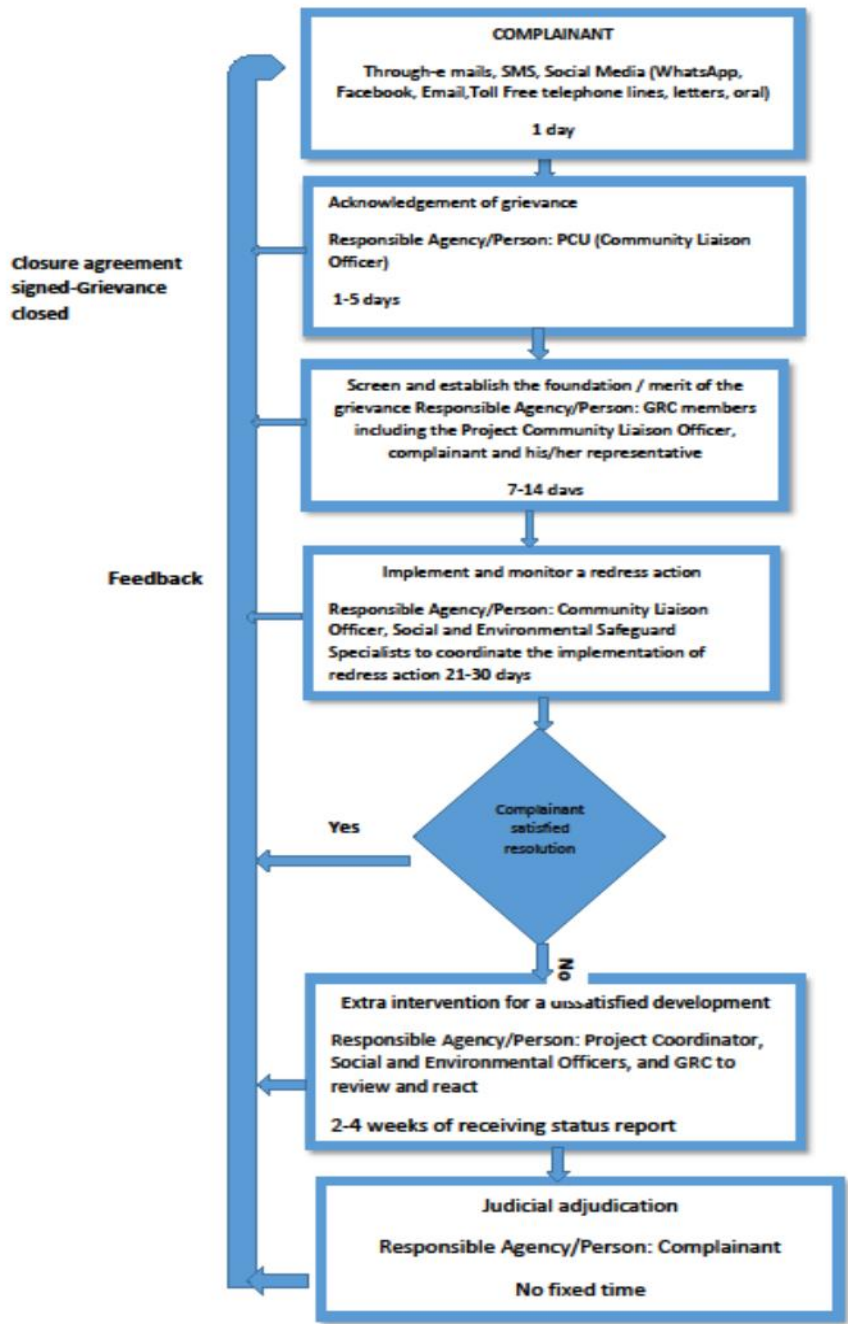


Figure 28: GM Special Procedures

15. REFERENCES

1. Campbell, Alec C. (1987). *Archaeological review Sukwane reservoir area*. Commissioned by Snowy Mountains Engineering Co., Southern Okavango integrated water development project for the Department of Water Affairs.
2. Campbell, Alec C. (1989). *Archaeological impact assessment. Initial survey*. Sowa Pan Branch Railway Line.
3. The World Bank Group (2021). *Climate Risk Profile: Botswana*
4. Denbow, James R. (1984). *Preliminary report on an archaeological reconnaissance of the B.P. Soda Ash Lease Makgadikgadi Pans Botswana*. Commissioned by British Petroleum: Gaborone and the Botswana Government.
5. Ebert, J. I. (1979). *An ethnoarchaeological approach to reassessing the meaning of variability in stone tool assemblages*. In Kramer, Carol ed. *Ethnoarchaeology: implications of ethnography for archaeology*. Columbia University Press: New York. pp. 69-74.
6. Gadibolae, MN (1985). *Serfdom (Bolata) in the Nata Area 1926-1960: Botswana Notes and Records* 17, 25-32
7. GS10 project: BRGM (1991). *Evaluation of groundwater resources (GS10): Letlhakeng Botlhapatlou groundwater project main report*.
8. Han, C. (2009). *Dynamic and Lasting Impacts: Socioeconomic Effects of Protracted Refugee Camps on Host Communities in Tanzania*. BA in Public Policy. Sanford Institute of Public Policy: Duke University.
9. Hinz, MO. (2003). *Without Chiefs there Would be No Game: Customary Law and Nature Conservation*. Windhoek: Out of Africa.
10. Mabikwa, K. (2000). *Impact of the Zimbabwe Liberation War on the Border People: A Case of North East District 1970-1980* (BA research essay: University of Botswana,).
11. Majaha, R. (2016.) *Refugee and Host Community Relationships: A Case Study of Dukwi Refugee Settlement*: MA thesis University of the Free State
12. Makgadikgadi Framework Management Plan (2010). Centre for Applied Research: Republic of Botswana.
13. Mengwe, MS (2010). *Towards Social Impact Assessment of Copper-Nickel Mining in Botswana* (PhD thesis: Faculty of Science Nelson Mandela Metropolitan University).
14. Morapedi, W.G. (2012). *The Dilemmas of Liberation in Southern Africa: The Case of Zimbabwean Liberation Movements and Botswana 1960—1979*: *Journal of Southern African Studies* 38 (1) 73-90.
15. Parsons, N. (2008). *The Pipeline: Botswana's Reception of Refugees: 1956-1968* *Social Dynamics* 34, 17-32.
16. Rannoba, TF (2019). *The Relations Between Basarwa and Other Ethnic Groups: A Case of the Cire Cire in Matsitama* (BA History dissertation: University of Botswana).
17. Reid, Andrew and Alinah Segobye (2000a) *An ivory cache from Botswana* *Antiquity* 74: 326-331. 2000b *Politics, society and trade on the eastern margins of the Kalahari: In Leslie, Mary and Tim Maggs, eds., African naissance the Limpopo valley 1000 years ago*.
18. Reid, D. Andrew M., Sadr, K. and Hanson-James, N. (1998). *Herding traditions in Botswana: In Lane, Paul, Andrew Reid and Alinah Segobye, eds. Ditswa mmung. The archaeology of Botswana*: Pula Press and the Botswana Society Gaborone.
19. Sanoto, R. (1992). *The Impact of the Zimbabwe Liberation War on the Babirwa: 1970-1980* (BA research essay: University of Botswana)
20. Southall, R. (1984). Botswana as a Host Country for Refugees: *The Journal of Commonwealth and Comparative Politics*, 22(2) 151-179.

21. Thapelo, TD (2003). *Public Policy and San Displacement in Liberal Democratic Botswana: Pula: Journal of African Studies* 17 (2), 93-104.
22. G. Stansfield (1973). *The geology of the area around Dukwi and Tlalamabele*, Central District, Botswana, including maps of Quarter Degree Sheets 2026C and 2126A on the scale 1:125,000
- D. Green (1966). *The Karoo System in Bechuanaland*
23. R.A. Smith (1984). *The lithostratigraphy of the Karoo Supergroup in Botswana. Volume 1*
- Thomas, D. and 24. Burrough, S. (2009). *Palaeolithic mega-lakes and early human occupation of the Kalahari* CYSC/a/17/2II (44). *Preliminary Project Report* Cambridge University Press: Cambridge.
- Thomas, D.S.G. and Shaw, P.A. (1991). *The Kalahari Environment*: Cambridge University Press.
- Tlou, T. and Campbell, A. (1997) *History of Botswana*. Gaborone: MacMillan.
- DWA (1976) *Water Surveys Botswana: Main report*

ANNEX 1: MINUTES OF CONSULTATIONS

MEETING: PUBLIC CONSULTATIONS SOWA WATER SUPPLY SCHEME	
DATE: 11/10/2021	VENUE: Kutamogoree Kgotla
START TIME: 08:00	ADJOUNED TIME: 09:45
ITEM	KEY DISCUSSION
Opening Prayer	Ms Garebaitse
Introductions	Mr Master (MC of the day) introduced the dignitaries as well as members of the village. Mr Gopolang then introduced his team and gave a brief company overview.
Welcome Remarks	Kgosi Motsamai welcomed everyone and explained the mandate of the meeting.
Presentation	<p>Mr Gopolang stated that Water Utilities Corporation has engaged (Enviro Solve Consultancy (Pty) Ltd) to conduct an Environmental and Social Impact Assessment for the Sowa Water Supply Scheme which covers the villages of Kutamogoree, Mosetse, Dukwi, Sepako, Maposa, Manxotae, Nata and Sowa Town.</p> <p>Mr Gopolang stated that proposals for the upgrading of the water supply systems in the area were prepared in 2009 and 2014, but these were never implemented due to lack of funds.</p> <p>The Government of Botswana through Water Utilities Corporation (WUC) has since secured funding from the World Bank to address Botswana Emergency Water Security and Efficiency Project. The Sowa Water Supply Scheme is a sub-project under this project. Mr Gopolang said that the environmental and social policies of the World Bank require the project to conduct an Environmental and Social Impact Assessment (ESIA) in line with World Bank's Operational Policy Procedures and Standards as well as the EA Act of Botswana which require a public consultation meeting prior to any developments taking place within the project villages. The purpose of the consultation meeting is to solicit public views on the proposed project.</p> <p>Description of proposed development:</p> <p>Mr Gopolang added that the proposed works aim to optimize the existing water supply scheme to ensure adequate and reliable water supply to the population of the villages of the Sowa Cluster over a 20-year design horizon. He said that water in the cluster has been supplied from the Dukwi well field, which comprises several boreholes with different yields. The problem in the 8 villages is not lack of water per se but its loss along the pipes owing to bursts, damages by wildlife especially elephants and vandalism which then results in low supply. One other predicament is the saline water which clogs pipes hence inadequate supply.</p> <p>The scheme in use was established in the 80's and has since become outdated, therefore a revised one is needed which will run until 2041. Mr Gopolang highlighted that; it should be noted that this project will be a bulk water supply not distribution/ reticulation to homesteads.</p> <p>He said that the project is at the design stage and the preliminary designs comprise of;</p> <p>Pipelines</p> <ul style="list-style-type: none"> • Dukwi Waterworks to Dukwi East with a take-off to Dukwi Village. • Dukwi East to Mosetse East. • Mosetse East to Kutamogoree. • Dukwi Waterworks to Nata Waterworks. • Nata Waterworks to Manxotae with a take-off to Maposa. • Manxotae to Sepako. • Dukwi Waterworks to Sowa Waterworks.

	<p>Pump stations, Reservoirs and Elevated tanks:</p> <ul style="list-style-type: none"> • New elevated tank at Kutamogoree. • New pump station at Moseitse East. • New Control valve chamber at Moseitse West. • New elevated tank at Dukwi East. • New elevated tank at Dukwi Village. • New Control valve chamber at Dukwi Village. • New pump station at Dukwi Waterworks. <p>Mr Gopolang also stated the impacts as a result of the developments including air pollution due to dust, noise pollution from machinery on site. He also said that there might be cases of family break ups as a result of moral decay e.g. promiscuity as well as GBV cases. During civil works for different project activities, there might be grievances on damage to private property.</p> <p>As a mitigation plan there will be spraying of water to suppress dust, work should be done during the day to limit noise. Mr Gopolang also asked the community to air out their expected impacts and mitigations thereof as a result of the implementation of the project. He however said there will be a Grievance Redress Mechanism which will be aimed at addressing all grievances as a result of the implantation of the project. He also added that there will be a Community Liaison Officer from the community who will be employed to act as an intermediary between client and the community.</p> <p>Mr Gopolang also added that they (ESIA consultants) will also be present during the construction period to facilitate compliance by all.</p> <p>The positive possible impacts include employment creation; recruitment will be done at the kgotla, availability of better tasting water resulting in improvements in standard of living, supply chain effects which will bring an upgrade to the economy of the village; selling of food to contractors and provision of accommodation.</p> <p>Mr Gopolang stated that one of the operational standards of the World Bank triggers vulnerable groups and/or indigenous people; women, children, those living with disabilities and Basarwa. He said there will be a Vulnerable Community Plan which will be drafted for the community of Manxotae. The VCP will capture their livelihoods, where they are from, their ages, statistics of families, what made them move from their places of origin etc. It will basically cover their history and where we are headed with them (future prospects).</p> <p>Mr Gopolang then opened a floor for comments and discussions.</p>
COMMENTS	<p>Ms Margaret Moribame; welcomed the developments and that they should be prioritised when it comes to recruitment. Her issue of concern was brackish water in the area and from what she got; water will be sourced from Dukwi wellfield which is still brackish. Please look for alternative sources of bringing good tasting water like the one you drink in towns and cities.</p> <p>*Mr Gopolang- it is a well-known fact that the water in this cluster is brackish, and all your suggestions and recommendations will be considered. He assured the community that the project shall come to fruition and they too shall drink pleasant water as the design engineers are still assessing the best possible way to treat the water before distribution.</p> <p>Mr Mokotedi; His outcry was shortage and saline water in the village which damaged their appliances due to calcium carbonate build up. He further added that family break ups are still prevalent in society even without presence of contractors so that should not hinder the process. He is thankful of the job creation opportunities.</p>

	<p>*Mr Gopolang- appreciated his feedback. And guaranteed that they shall be present throughout the project implementation to ensure there is compliance by all parties involved. Recruitment selection will be done fairly at the kgotla. Every community will have a local CLO who will be a mediator between the client and the community. The candidate will use a grievance redress mechanism; a tool which stipulates how complaints are to be addressed/ resolved. Contractors in previous projects have complained about lack of dedication from the community after job enrolments, which delay the project when they have to re-hire. He pleaded with them to grab this opportunity with both hands.</p> <p>Mr Zibanani Badi; advised that recruitment be done at the kgotla with transparency and open to all. Contractors shouldn't forget to backfill trenches at completion of project to avoid injuries to livestock.</p> <p>*Mr Gopolang- ascertained him that the pits and trenches shall be backfilled accordingly.</p> <p>Kgosi Motsamai; cooperation is imperative and community should be prepared for all outcomes brought by the project, both negative and positive. He advised them to remain committed to their families, avoid temptations leading to infidelities which are coupled with infections and passion killings. Farmers committee should be wary of injuries to livestock caused by open pits and resolve disputes before contract ends. Implement proper channels of disposal of oils in ways that it does not affect the environment. He encouraged those with houses to let, to do so in order to generate revenue but with proper contracts in place.</p> <p>* Mr Gopolang- There is not much to be added to what Kgosi said; he laid it down very well. The project shall come to completion with unity for all involved. Assessments and designs should be complete by December, then the tendering process for contractors will take about 3 months. Around April 2022, expectation is that the project shall commence. Injuries to livestock will be addressed by the CLO through the GM. Cautioned farmers to desist from opening potable water valves for their livestock as it is a drawback. Oils shall be disposed of safely and accordingly; this will also be addressed in the main ESIA report.</p> <p>Mr Seloko; Asked for clarity of compensation procedure. Is it only for those with permanent structures? He added that they have water shortage in the village and the water is salty and that recruitment must be reserved for members of their village: no labourers should be from neighbouring villages. Mr Seloko advised that elevated tanks should be positioned centrally for easy connections into yards.</p> <p>*Mr Gopolang- compensation will be for all structures destroyed/ removed. Even those where pipes will encroach into their homes will be recompensed. Positioning of the elevated tanks is a decision to be made by the engineers on site.</p> <p>Kgosi Kolowe; acknowledged presence of visitors. Water scarcity and salty water were his areas of concern. In addition, he mentioned that Dukwi water was also salty and advised that water be sourced elsewhere where it is not saline.</p> <p>*Mr Gopolang- assured Kgosi that the project will put an end to their water crisis issues.</p> <p>By show of hands, the community is looking forward to commencement of the project. The village has 6 standpipes but only 2 are operating with defects.</p>
Closing Remarks	Head teacher-Ms Chanana; Grateful for water provision and the developments the project is to bring. Thanked the community for attending.
Closing Prayer	Ms Garebaitse

MEETING: PUBLIC CONSULTATIONS SOWA WATER SUPPLY SCHEME	
DATE: 11/10/2021	VENUE: Moseitse Kgotla
START TIME: 12:00	ADJOUNED TIME: 13:05
ITEM	KEY DISCUSSION
Opening Prayer	Kgosi Monotshi
Introductions	Ms Akanyang (VDC treasure) introduced the village leadership and members of the village. Mr Gopolang then introduced his team and gave a brief overview of Enviro Solve Consultancy.
Welcome Remarks	Kgosi Gabaneo welcomed everyone and explained purpose of the meeting.
Presentation	<p>Mr Gopolang stated that Water Utilities Corporation has engaged (Enviro Solve Consultancy (Pty) Ltd) to conduct an Environmental and Social Impact Assessment for the Sowa Water Supply Scheme which covers the villages of Kutamogoree, Moseitse, Dukwi, Sepako, Maposa, Manxotae, Nata and Sowa Town.</p> <p>Mr Gopolang stated that proposals for the upgrading of the water supply systems in the area were prepared in 2009 and 2014, but these were never implemented due to lack of funds.</p> <p>The Government of Botswana through Water Utilities Corporation (WUC) has since secured funding from the World Bank to address Botswana Emergency Water Security and Efficiency Project. The Sowa Water Supply Scheme is a sub-project under this project. Mr Gopolang said that the environmental and social policies of the World Bank require the project to conduct an Environmental and Social Impact Assessment (ESIA) in line with World Bank's Operational Policy Procedures and Standards as well as the EA Act of Botswana which require a public consultation meeting prior to any developments taking place within the project villages. The purpose of the consultation meeting is to solicit public views on the proposed project.</p> <p>Description of proposed development:</p> <p>Mr Gopolang added that the proposed works aim to optimize the existing water supply scheme to ensure adequate and reliable water supply to the population of the villages of the Sowa Cluster over a 20-year design horizon. He said that water in the cluster has been supplied from the Dukwi well field, which comprises several boreholes with different yields. The problem in the 8 villages is not lack of water per se but its loss along the pipes owing to bursts, damages by wildlife especially elephants and vandalism which then results in low supply. One other predicament is the saline water which clogs pipes hence inadequate supply.</p> <p>The scheme in use was established in the 80's and has since become outdated, therefore a revised one is needed which will run until 2041. Mr Gopolang highlighted that, it should be noted that this project will be a bulk water supply and not distribution/ reticulation to homesteads.</p> <p>He said that the project is at the design stage and the preliminary designs comprise of;</p> <p>Pipelines</p> <ul style="list-style-type: none"> • Dukwi Waterworks to Dukwi East with a take-off to Dukwi Village. • Dukwi East to Moseitse East. • Moseitse East to Kutamogoree. • Dukwi Waterworks to Nata Waterworks. • Nata Waterworks to Manxotae with a take-off to Maposa. • Manxotae to Sepako. • Dukwi Waterworks to Sowa Waterworks. <p>Pump Stations, Reservoirs and Elevated Tanks:</p>

	<ul style="list-style-type: none"> • New elevated tank at Kutamogoree. • New pump station at Moseitse East. • New Control valve chamber at Moseitse West. • New elevated tank at Dukwi East. • New elevated tank at Dukwi Village. • New Control valve chamber at Dukwi Village. • New pump station at Dukwi Waterworks. <p>Mr Gopolang also stated the impacts because of the developments including air pollution due to dust, noise pollution from machinery on site. He also said that there might be cases of family break ups because of moral decay e.g., promiscuity as well as GBV cases. During civil works for different project activities, there might be grievances on damage to private property.</p> <p>As a mitigation plan there will be spraying of water to suppress dust, work should be done during the day to limit noise. Mr Gopolang also asked the community to air out their expected impacts and mitigations thereof because of the implementation of the project. He however said there will be a Grievance Redress Mechanism which will be aimed at addressing all grievances because of the implantation of the project. He also added that there will be a Community Liaison Officer from the community who will be employed to act as an intermediary between client and the community.</p> <p>Mr Gopolang also added that they (ESIA consultants) will also be present during the construction period to facilitate compliance by all.</p> <p>The positive possible impacts include employment creation; recruitment will be done at the kgotla, availability of better tasting water resulting in improvements in standard of living, supply chain effects which will bring an upgrade to the economy of the village; selling of food to contractors and provision of accommodation.</p> <p>Mr Gopolang stated that one of the operational standards of the World Bank triggers vulnerable groups and/or indigenous people; women, children, those living with disabilities and Basarwa. He said there will be a Vulnerable Community Plan which will be drafted for the community of Manxotae. The VCP will capture their livelihoods, where they are from, their ages, statistics of families, what made them move from their places of origin etc. It will basically cover their history and where we are headed with them (future prospects).</p> <p>Mr Gopolang then opened a floor for comments and discussions.</p>
COMMENTS	<p>Mr Motlhanka Sefako; had water connected to his homestead in 2009 and been experiencing low pressure since then, so he was enquiring if he can switch pipelines from the old ones to the new ones.</p> <p>*Mr Gopolang- noted his concern, however, that is a WUC issue. It is beyond him but will get into talks with them to see how best possible they would help.</p> <p>Mr Oagile Thakamo; approves the proposed project. The project is long overdue. It is upon them as individuals to behave and reduce GBV cases.</p> <p>*Mr Gopolang- appreciated his feedback.</p> <p>Mr Bokutlho; complained of lack of water in their village. It is so bad that they walk long distances to get water. WUC has given them empty promises over the years. He further stated that the selected contractor should be of good conduct.</p>

	<p>*Mr Gopolang- reassured him that this project shall live up to what it promises. A CLO will be engaged to deal with their complaints in the village including misconduct from contractors should there be any.</p> <p>Ms Maano; needed clarity on what the consultancy does and if they are a part of WUC. She is tired of the promises that are never fulfilled. She also asked where exactly the water will be sourced.</p> <p>* Mr Gopolang- Enviro Solve is a private entity, contracted by WUC for environmental and social consultancy services for the proposed Sowa Water Supply Scheme. However, your concerns will be communicated with WUC.</p> <p>Ms Tamapo; Asked if the boreholes will be enough to supply water to all the 8 villages.</p> <p>*Mr Gopolang- there is enough water at the Dukwi wellfield; problem is water loss along the pipelines owing to bursts and vandalism by some farmers for their livestock, destruction by wildlife especially elephants. And clogging of pipes which then results in low pressure in the village.</p> <p>Mr Phuthego; Encouraged the community to behave well to avoid disruptions to families and GBV cases.</p> <p>*Mr Gopolang- thanked him for his contribution.</p> <p>Mr Monosi; pointed out that there is a pipe leakage at the Sowa turn off.</p> <p>*Mr Gopolang-noted his heads-up.</p> <p>By show of hands, the community is pro-development. The village has 1 standpipe which functions well.</p>
Closing Remarks	Kgosi Ntshwarelang; Thanked all the attendees.
Closing Prayer	Kgosi Monotshi

MEETING: PUBLIC CONSULTATIONS SOWA WATER SUPPLY SCHEME	
DATE: 11/10/2021	VENUE: Dukwi Kgotla
START TIME: 15:00	ADJOUNED TIME: 16:10
ITEM	KEY DISCUSSION
Opening Prayer	Moruti Antonio
Introductions	The stakeholders were all introduced; protocol observed. Mr Gopolang then introduced his team and gave a brief company overview.
Welcome Remarks	Kgosi Twaelano welcomed everyone and stated that WUC had recently met with the community prior to our briefing, to inform them of their plans to improve the water situation. He apologised for those absent due to work commitments.
Presentation	<p>Mr Gopolang stated that Water Utilities Corporation has engaged (Enviro Solve Consultancy (Pty) Ltd) to conduct an Environmental and Social Impact Assessment for the Sowa Water Supply Scheme which covers the villages of Kutamogoree, Moseitse, Dukwi, Sepako, Maposa, Manxotae, Nata and Sowa Town.</p> <p>Mr Gopolang stated that proposals for the upgrading of the water supply systems in the area were prepared in 2009 and 2014, but these were never implemented due to lack of funds.</p> <p>The Government of Botswana through Water Utilities Corporation (WUC) has since secured funding from the World Bank to address Botswana Emergency Water Security and Efficiency Project. The Sowa Water Supply Scheme is a sub-project under this project. Mr Gopolang said that the environmental and social policies of the World Bank require the project to conduct an Environmental and Social Impact Assessment (ESIA) in line with World Bank's Operational Policy Procedures and Standards as well as the EA Act of Botswana which require a public consultation meeting prior to any developments taking place within the project villages. The purpose of the consultation meeting is to solicit public views on the proposed project.</p> <p>Description of proposed development:</p> <p>Mr Gopolang added that the proposed works aim to optimize the existing water supply scheme to ensure adequate and reliable water supply to the population of the villages of the Sowa Cluster over a 20-year design horizon. He said that water in the cluster has been supplied from the Dukwi well field, which comprises several boreholes with different yields. The problem in the 8 villages is not lack of water per se but its loss along the pipes owing to bursts, damages by wildlife especially elephants and vandalism which then results in low supply. One other predicament is the saline water which clogs pipes hence inadequate supply.</p> <p>The scheme in use was established in 1985 and has since become outdated, therefore a revised one is needed which will run until 2041. Mr Gopolang highlighted that, it should be noted that this project will be a bulk water supply not distribution/ reticulation to homesteads.</p> <p>He said that the project is at the design stage and the preliminary designs comprise of;</p> <p>Pipelines</p> <ul style="list-style-type: none"> • Dukwi Waterworks to Dukwi East with a takeoff to Dukwi Village. • Dukwi East to Moseitse East. • Moseitse East to Kutamogoree. • Dukwi Waterworks to Nata Waterworks. • Nata Waterworks to Manxotae with a take-off to Maposa. • Manxotae to Sepako. • Dukwi Waterworks to Sowa Waterworks. <p>Pump stations, Reservoirs and Elevated tanks:</p> <ul style="list-style-type: none"> • New elevated tank at Kutamogoree.

	<ul style="list-style-type: none"> • New pump station at Moseitse East. • New Control valve chamber at Moseitse West. • New elevated tank at Dukwi East. • New elevated tank at Dukwi Village. • New Control valve chamber at Dukwi Village. • New pump station at Dukwi Waterworks. <p>Mr Gopolang also stated the impacts as a result of the developments including air pollution due to dust, noise pollution from machinery on site. He also said that there might be cases of family break ups as a result of moral decay e.g. promiscuity as well as GBV cases. During civil works for different project activities, there might be grievances on damage to private property.</p> <p>As a mitigation plan there will be spraying of water to suppress dust, work should be done during the day to limit noise. Mr Gopolang also asked the community to air out their expected impacts and mitigations thereof as a result of the implementation of the project.</p> <p>He however said there will be a Grievance Redress Mechanism which will be aimed at addressing all grievances as a result of the implantation of the project. He also added that there will be a Community Liaison Officer from the community who will be employed to act as an intermediary between client and the community.</p> <p>Mr Gopolang also added that they (ESIA consultants) will also be present during the construction period to facilitate compliance by all.</p> <p>The positive possible impacts include employment creation; recruitment will be done at the kgotla, availability of better tasting water resulting in improvements in standard of living, supply chain effects which will bring an upgrade to the economy of the village; selling of food to contractors and provision of accommodation.</p> <p>Mr Gopolang stated that one of the operational standards of the World Bank triggers vulnerable groups and/or indigenous people; women, children, those living with disabilities and Basarwa. He said there will be a Vulnerable Community Plan which will be drafted for the community of Manxotae. The VCP will capture their livelihoods, where they are from, their ages, statistics of families, what made them move from their places of origin etc. It will basically cover their history and where we are headed with them (future prospects).</p> <p>Mr Gopolang then opened a floor for comments and discussions.</p>
COMMENTS	<p>Moruti Antonio; will the pipes branch out into the village? What is going to happen to homesteads where pipes pass and when the project will commence and its duration.</p> <p>*Mr Gopolang- the project is a bulk water supply; focus is on providing the village with sufficient water up to the elevated tanks. There is no distribution/reticulation to homesteads in the villages. Pipes layout are designed in such a way that they do not encroach/disturb people’s property. But in the event of such grievance, every community will have a local CLO who will be a mediator between the client and the community. The candidate will use the Grievance Redress Mechanism; a tool which stipulates how complaints are to be addressed/resolved.</p> <p>There will be a compensation plan in place through the help of the CLO. Project mobilisation will be sometime around April next year and run for 2 years.</p> <p>Kgosi Mosweu; His main concern was shortage and saline water in the village which damaged their appliances due to calcium carbonate build up. He suggested that maybe WUC could use the calcium carbonate to generate electricity. The water is distasteful and</p>

	<p>damages clothes; they wear off quickly. He further recommended that pit latrines should be “banned” as they contaminate underground water.</p> <p>The village has 3 working standpipes the rest have been demolished. Kgosi pleaded that WUC reconnects them again and also create a pond in the village as rainfall is unreliable. Install a purification system. There are high defilement cases: underage children queue at standpipes at night to draw water since pressure is better in the evenings.</p> <p>*Mr Gopolang acknowledged the contribution by Kgosi Mosweu as vital information needed for assessments.</p> <p>Mr Josiah; The Dukwi Junior school headmaster stated there are 756 students at his school, 80% are borders. Water shortage disturbs running of the school. During this time of COVID-19, it is very important to have water. They have reserved evening study for completing classes while the rest flock for water as pressure is better in the evening. Their appliances don not last due to calcium carbonate build up.</p> <p>*Mr Gopolang- it is clear from the discussion that water is really needed. It is a straight forward project which aims at improving the water situation in the village. Analysis of alternatives; the engineers are deciding on which pipes to use-steel or plastic? Since not all of us can connect water into our homesteads, world bank proposes that WUC reinstalls the demolished standpipes so that everyone has access to water and come up with mitigation measure to guard against water loss, e.g., use of tokens.</p> <p>By show of hands, the community is looking forward to commencement of the project. The village has a dumping site which is not fenced.</p>
Closing Remarks	Kgosi Mosweu; Thanked all present for coming.
Closing Prayer	Mr Maitumelo

MEETING: CONSULTATIONS SOWA WATER SUPPLY SCHEME	
DATE: 11/10/2021	VENUE: Dukwi Refugee Camp
START TIME: 16:30	ADJOUNED TIME: 17:45
ITEM	KEY DISCUSSION
Introductions	The settlement Commandant (Mr Majaga) introduced himself and welcomed us into his camp. Mr Gopolang made introductions and gave a brief overview of Enviro Solve Consultancy (Pty) Ltd.
Presentation	<p>Mr Gopolang stated that Water Utilities Corporation has engaged (Enviro Solve Consultancy (Pty) Ltd) to conduct an Environmental and Social Impact Assessment for the Sowa Water Supply Scheme which covers the villages of Kutamogoree, Moseitse, Dukwi, Sepako, Maposa, Manxotae, Nata and Sowa Town.</p> <p>Mr Gopolang stated that proposals for the upgrading of the water supply systems in the area were prepared in 2009 and 2014, but these were never implemented due to lack of funds.</p> <p>The Government of Botswana through Water Utilities Corporation (WUC) has since secured funding from the World Bank to address Botswana Emergency Water Security and Efficiency Project. The Sowa Water Supply Scheme is a sub-project under this project. Mr Gopolang said that the environmental and social policies of the World Bank require the project to conduct an Environmental and Social Impact Assessment (ESIA) in line with World Bank's Operational Policy Procedures and Standards as well as the EA Act of Botswana which require a public consultation meeting prior to any developments taking place within the project villages. The purpose of the consultation meeting is to solicit public views on the proposed project.</p> <p>Description of proposed development: Mr Gopolang added that the proposed works aim to optimize the existing water supply scheme to ensure adequate and reliable water supply to the population of the villages of the Sowa Cluster over a 20-year design horizon. He said that water in the cluster has been supplied from the Dukwi well field, which comprises several boreholes with different yields. The problem in the 8 villages is not lack of water per se but its loss along the pipes owing to bursts, damages by wildlife especially elephants and vandalism which then results in low supply. One other predicament is the saline water which clogs pipes hence inadequate supply.</p> <p>The scheme in use was developed in the 1985 and has since become outdated, therefore a revised one is needed which will run until 2041. Mr Gopolang highlighted that, it should be noted that this project will be a bulk water supply not distribution/ reticulation to homesteads. He said that the project is at the design stage and the preliminary designs comprise of;</p> <p>Pipelines</p> <ul style="list-style-type: none"> • Dukwi Waterworks to Dukwi East with a takeoff to Dukwi Village. • Dukwi East to Moseitse East. • Moseitse East to Kutamogoree. • Dukwi Waterworks to Nata Waterworks. • Nata Waterworks to Manxotae with a take-off to Maposa. • Manxotae to Sepako. • Dukwi Waterworks to Sowa Waterworks. <p>Pump stations, Reservoirs and Elevated tanks:</p> <ul style="list-style-type: none"> • New elevated tank at Kutamogoree. • New pump station at Moseitse East. • New Control valve chamber at Moseitse West. • New elevated tank at Dukwi East.

	<ul style="list-style-type: none"> • New elevated tank at Dukwi Village. • New Control valve chamber at Dukwi Village. • New pump station at Dukwi Waterworks. <p>Mr Gopolang stated that one of the operational standards of the World Bank triggers vulnerable groups and/or indigenous people; women, children, those living with disabilities and Basarwa. He said there will be a Vulnerable Community Plan which will be drafted for the community of Manxotae. The VCP will capture their livelihoods, where they are from, their ages, statistics of families, what made them move from their places of origin etc. It will basically cover their history and where we are headed with them (future prospects).</p>
COMMENTS	<p>Mr Majaga; so with the VCP, will a sociologist collect the census and later compile a report? Asked why Lepashe isn't part of the plan since it has the largest concentration of the Basarwa. In fact, all these villages have Basarwa, but the statistics can be sought from the Social and Welfare Officer in the area.</p> <p>*Mr Gopolang- yes a sociologist will be engaged. The VCPs will be conducted on villages with the presence of Basarwa and vulnerable groups such as Dukwi Refugee Camp, and we have since established the villages of Kutamogore, Moseitse, Dukwi Camp & Manxotae.</p> <p>Mr Majaga; Currently in the camp, water is free for all; the community standpipes are not billed. However, those with the means are allowed to buy plumbing material and connections are made for them.</p> <p>The current group is very heterogeneous. The present nationalities are into markets; they own garages and livelihoods projects e.g. poultries within the camp. Officially movement out of the camp is on a permit basis, Botswana has an encampment policy-the refugees should only be found within the camp but custom and tradition, over the years they have been free to go out. We have made certain reservations to the 1951 Geneva convention and one of the clauses is freedom of movement for these people and article 17 on employment; a refugee cannot have gainful employment while living in the camp. However, practice is different from what is written. The challenge with reservations of articles is that they have to be domesticated, something we have not done as a country, so we cannot enforce something that is not a part of our domestic laws. The refugee act is very old; it was created in 1967. It does not speak to today's issues.</p> <p>The camp has 18 nationalities from as far as Morocco, Somalia, Democratic Republic of Congo, Burundi, Algeria, Kenya, Rwanda, Namibia, Zimbabwe, and Sierra Leone. The oldest refugee in the camp is from Morocco, who arrived here in 1978. Some are cases of trafficking. The highest numbers of refugees are from DRC followed by Somalia then Burundi. It is a diverse camp; the numbers are around 1300, children being the majority. There is almost a balance in the genders.</p> <p>The camp has a clinic, primary school and a police post. When the camp was set up in 1978, the village of Dukwi was a cattle post. The first group were political refugees from countries that were led by white minority regimes. So a place had to be found a distance away from the centre of refugees for workers, that is when the village was set up in 1980. The current group can be termed as "economic refugees" they are driven by conflicts in their countries. Totalitarian regimes e.g. Uganda or failed states e.g. DRC. From early 2000 we saw a group we could not circumscribe and does not even fit into what our national legislation terms as a refugee because our act was designed to describe a political refugee.</p> <p>*Mr. Gopolang- Asked if there are Batswana refugees in other countries</p>

	<p>Mr Majaga; they seek asylum but do not fit into the description of refugees. UNCHR has developed a biometric registration to help reduce multiple identities but the system is slow because of lack of funding and also voluntary.</p> <p>*Mr Gopolang- How long can one stay in a refugee camp?</p> <p>Mr Majaga; For as long as they wish. A refugee situation has what is called 3 durable solutions:</p> <ol style="list-style-type: none"> 1. Voluntary repatriation- this is the most preferred solution that if the situation back home settles, you should be returned in safety and dignity. 2. Local integration- the host country should have a local integration criteria policy for integrating a certain percentage of these people. Botswana currently does not have one. 3. Resettlement to a third country- mainly western countries; America, Australia, Canada, Germany and the UK. <p>Only one 1 African country has volunteered to resettle refugees; Chad but because it is poor, nobody wants to go there.</p> <p>The water situation in the camp is not so bad; apart from saline water which destroys their appliances all is well. There are no shortages. His only wish is to have clean water and know the map of pipelines.</p>
Closing Remarks	<p>Mr Majaga; recommended that clear policies be made to eliminate loopholes in the country's refugee policy</p>

MEETING : PUBLIC CONSULTATIONS SOWA WATER SUPPLY SCHEME	
DATE: 12/10/2021	VENUE : Maposa Kgotla
START TIME: 15:13	ADJOUNED TIME: 16:50
ITEM	KEY DISCUSSION
Opening Prayer	Ms Kemmone
Introductions	Mr Ontiretse introduced the dignitaries as well as members of the village. Mr Gopolang then introduced us and gave a brief company overview.
Welcome Remarks	Kgosi Maposa welcomed everyone and explained purpose of the meeting.
Presentation	<p>Mr Gopolang stated that Water Utilities Corporation has engaged (Enviro Solve Consultancy (Pty) Ltd) to conduct an Environmental and Social Impact Assessment for the Sowa Water Supply Scheme which covers the villages of Kutamogoree, Moseitse, Dukwi, Sepako, Maposa, Mmanxotae, Nata and Sowa Town.</p> <p>Mr Gopolang stated that proposals for the upgrading of the water supply systems in the area were prepared in 2009 and 2014, but these were never implemented due to lack of funds.</p> <p>The Government of Botswana through Water Utilities Corporation (WUC) has since secured funding from the World Bank to address Botswana Emergency Water Security and Efficiency Project. The Sowa Water Supply Scheme is a sub-project under this project. Mr Gopolang said that the environmental and social policies of the World Bank require the project to conduct an Environmental and Social Impact Assessment (ESIA) in line with World Bank's Operational Policy Procedures and Standards as well as the EA Act of Botswana which require a public consultation meeting prior to any developments taking place within the project villages. The purpose of the consultation meeting is to solicit public views on the proposed project.</p> <p>Description of proposed development:</p> <p>Mr Gopolang added that the proposed works aim to optimize the existing water supply scheme to ensure adequate and reliable water supply to the population of the villages of the Sowa Cluster over a 20-year design horizon. He said that water in the cluster has been supplied from the Dukwi well field, which comprises several boreholes with different yields. The problem in the 8 villages is not lack of water per se but its loss along the pipes owing to bursts, damages by wildlife especially elephants and vandalism which then results in low supply. One other predicament is the saline water which clogs pipes hence inadequate supply.</p> <p>The scheme in use was established in 1985 and has since become outdated, therefore a revised one is needed which will run until 2041. Mr Gopolang highlighted that, it should be noted that this project will be a bulk water supply not distribution/ reticulation to homesteads.</p> <p>He said that the project is at the design stage and the preliminary designs comprise of;</p> <p>Pipelines</p> <ul style="list-style-type: none"> • Dukwi Waterworks to Dukwi East with a take-off to Dukwi Village. • Dukwi East to Moseitse East. • Moseitse East to Kutamogoree. • Dukwi Waterworks to Nata Waterworks. • Nata Waterworks to Manxotae with a take-off to Maposa. • Manxotae to Sepako. • Dukwi Waterworks to Sowa Waterworks. <p>Pump stations, Reservoirs and Elevated tanks:</p> <ul style="list-style-type: none"> • New elevated tank at Kutamogoree.

	<ul style="list-style-type: none"> • New pump station at Moseitse East. • New Control valve chamber at Moseitse West. • New elevated tank at Dukwi East. • New elevated tank at Dukwi Village. • New Control valve chamber at Dukwi Village. • New pump station at Dukwi Waterworks. <p>Mr Gopolang also stated the impacts as a result of the developments including air pollution due to dust, noise pollution from machinery on site. He also said that there might be cases of family break ups as a result of moral decay e.g. promiscuity as well as GBV cases. During civil works for different project activities, there might be grievances on damage to private property.</p> <p>As a mitigation plan there will be spraying of water to suppress dust, work should be done during the day to limit noise. Mr Gopolang also asked the community to air out their expected impacts and mitigations thereof as a result of the implementation of the project.</p> <p>He however said there will be a Grievance Redress Mechanism which will be aimed at addressing all grievances as a result of the implantation of the project. He also added that there will be a Community Liaison Officer from the community who will be employed to act as an intermediary between client and the community.</p> <p>Mr Gopolang also added that they (ESIA consultants) will also be present during the construction period to facilitate compliance by all.</p> <p>The positive possible impacts include employment creation; recruitment will be done at the kgotla, availability of better tasting water resulting in improvements in standard of living, supply chain effects which will bring an upgrade to the economy of the village; selling of food to contractors and provision of accommodation.</p> <p>Mr Gopolang stated that one of the operational standards of the World Bank triggers vulnerable groups and/or indigenous people; women, children, those living with disabilities and Basarwa. He said there will be a Vulnerable Community Plan which will be drafted for the community of Manxotae. The VCP will capture their livelihoods, where they are from, their ages, statistics of families, what made them move from their places of origin etc. It will basically cover their history and where we are headed with them (future prospects).</p> <p>Mr Gopolang then opened a floor for comments and discussions.</p>
COMMENTS	<p>Kgosi Maposa; sometimes constructions are done very close to homesteads and contractors out of stinginess; not wanting to compensate those they relocate, end up working on very limited space for instance, the main road is squeezed into people’s compounds. With this project he doesn’t want a similar situation.</p> <p>*Mr Gopolang- Noted his concern. The design engineers are on site, designing pipeline routes, I am sure they will look onto that.</p> <p>Mr Ontiretse; looking forward to commencement of project. The village has 7 standpipes, 3 aren’t working.</p> <p>Ms Maposa; Thrilled by the proposed proposal because it brings adequate supply and please treat the saline water. Our health has been compromised through ingestion of the water. Cautioned that pipes passing near homes may cause cracks. She also advised that recruitment be done at the kgotla with transparency and open to all genders</p>

	<p>*Mr Gopolang- Recruitment will be inclusive to both genders and we take note of your concerns.</p> <p>Ms Kemmone; women should also be given employment opportunities. They should not be side-lined.</p> <p>* Mr Gopolang-they will be included in the recruitment process. The World Bank encourages women empowerment.</p> <p>Mr Halahala; the road divides the village into 2 and the standpipes are on the other side of the road while houses on the other side. Children end up being hit by cars when they fetch water on the other end. Suggested that the pipeline should be on the side where there are houses.</p> <p>*Mr Gopolang- engineers will look into that when they design the plan. Safety of children is a priority.</p> <p>Mr Dimpho; the village has qualified traders who can operate machines so target shouldn't only be on labourers. Payments should be within the labour standard. There also should be clear channels for raising grievances.</p> <p>*Mr Gopolang- a Community Liaison Officer will be hired, who will act as an intermediary between the client and the community. He/she will address all grievances. There will also be a suggestion box for complaints the community has.</p> <p>*Mr Lloyd-they shall look into creating local employment and asked that a register be created for all those with qualifications.</p> <p>Mr Patrick; looking forward to the proposed developments. Qualified traders are available in the village, please do not side-line us. Engage land board for maps of the village to see where new pipelines could be placed.</p> <p>*Mr Gopolang- land board is a very important stakeholder together with the department of roads so they are all engaged in the design layout.</p> <p>Ms Kagisanyo; they usually go days without water due to disconnections as a result of pipe bursts and rationing so appeals to client that during installation of big new pipes, there should be a backup plan to cater for when there will be no water. Maybe buy JoJo's.</p> <p>*Mr Gopolang- will speak to WUC regarding water rationing.</p> <p>Mr Setlhomola; What are the qualification for the CLO post?</p> <p>*Mr Gopolang- BGSC.</p> <p>Mr Danger; where will the water come from?</p> <p>*Mr Gopolang- Dukwi Wellfield. The boreholes are within the Government Ranch in Dukwi.</p> <p>By show of hands, the community is looking forward to commencement of the project. They want recruitment to take place at the kgotla. Majority of the community is of the Basarwa descendants; another meeting will be set up for them to draw a vulnerable community plan as per the operational standards of world bank which triggers vulnerable groups or indigenous groups; women, children, those living with disabilities and Basarwa.</p>
Closing Remarks	Mr Ontiretse; Thanked the community for attending.
Closing Prayer	Ms Kemmone;

MEETING : PUBLIC CONSULTATIONS SOWA WATER SUPPLY SCHEME	
DATE: 13/10/2021	VENUE : Sepako Kgotla
START TIME: 08:00	ADJOUNED TIME: 09:30
ITEM	KEY DISCUSSION
Opening Prayer	Moruti;
Introductions	The stakeholders were all introduced by the VDC chair, Ms Suviya ; she also mentioned that the chief was not with us; Kgosi Ramaditse. Mr Gopolang made introductions and gave a brief company overview.
Welcome Remarks	Kgosi Nkaelang ; welcomed everyone and encouraged participation on what was to be discussed.
Presentation	<p>Mr Gopolang stated that Water Utilities Corporation has engaged (Enviro Solve Consultancy (Pty) Ltd) to conduct an Environmental and Social Impact Assessment for the Sowa Water Supply Scheme which covers the villages of Kutamogoree, Moseitse, Dukwi, Sepako, Maposa, Manxotae, Nata and Sowa Town.</p> <p>Mr Gopolang stated that proposals for the upgrading of the water supply systems in the area were prepared in 2009 and 2014, but these were never implemented due to lack of funds.</p> <p>The Government of Botswana through Water Utilities Corporation (WUC) has since secured funding from the World Bank to address Botswana Emergency Water Security and Efficiency Project. The Sowa Water Supply Scheme is a sub-project under this project. Mr Gopolang said that the environmental and social policies of the World Bank require the project to conduct an Environmental and Social Impact Assessment (ESIA) in line with World Bank's Operational Policy Procedures and Standards as well as the EA Act of Botswana which require a public consultation meeting prior to any developments taking place within the project villages. The purpose of the consultation meeting is to solicit public views on the proposed project.</p> <p>Description of proposed development:</p> <p>Mr Gopolang added that the proposed works aim to optimize the existing water supply scheme to ensure adequate and reliable water supply to the population of the villages of the Sowa Cluster over a 20-year design horizon. He said that water in the cluster has been supplied from the Dukwi well field, which comprises several boreholes with different yields. The problem in the 8 villages is not lack of water per se but its loss along the pipes owing to bursts, damages by wildlife especially elephants and vandalism which then results in low supply. One other predicament is the saline water which clogs pipes hence inadequate supply.</p> <p>The scheme in use was established in the 80's and has since become outdated, therefore a revised one is needed which will run until 2041. Mr Gopolang highlighted that, it should be noted that this project will be a bulk water supply not distribution/ reticulation to homesteads.</p> <p>He said that the project is at the design stage and the preliminary designs comprise of;</p> <p>Pipelines</p> <ul style="list-style-type: none"> • Dukwi Waterworks to Dukwi East with a take-off to Dukwi Village. • Dukwi East to Moseitse East. • Moseitse East to Kutamogoree. • Dukwi Waterworks to Nata Waterworks. • Nata Waterworks to Manxotae with a take-off to Maposa. • Manxotae to Sepako. • Dukwi Waterworks to Sowa Waterworks.

	<p>Pump stations, Reservoirs and Elevated tanks:</p> <ul style="list-style-type: none"> • New elevated tank at Kutamogoree. • New pump station at Moseitse East. • New Control valve chamber at Moseitse West. • New elevated tank at Dukwi East. • New elevated tank at Dukwi Village. • New Control valve chamber at Dukwi Village. • New pump station at Dukwi Waterworks. <p>Mr Gopolang also stated the impacts as a result of the developments including air pollution due to dust, noise pollution from machinery on site. He also said that there might be cases of family break ups as a result of moral decay e.g. promiscuity as well as GBV cases. During civil works for different project activities, there might be grievances on damage to private property.</p> <p>As a mitigation plan there will be spraying of water to suppress dust, work should be done during the day to limit noise. Mr Gopolang also asked the community to air out their expected impacts and mitigations thereof as a result of the implementation of the project.</p> <p>He however said there will be a Grievance Redress Mechanism which will be aimed at addressing all grievances as a result of the implantation of the project. He also added that there will be a Community Liaison Officer from the community who will be employed to act as an intermediary between client and the community.</p> <p>Mr Gopolang also added that they (ESIA consultants) will also be present during the construction period to facilitate compliance by all.</p> <p>The positive possible impacts include employment creation; recruitment will be done at the kgotla, availability of better tasting water resulting in improvements in standard of living, supply chain effects which will bring an upgrade to the economy of the village; selling of food to contractors and provision of accommodation.</p> <p>Mr Gopolang stated that one of the operational standards of the World Bank triggers vulnerable groups and/or indigenous people; women, children, those living with disabilities and Basarwa. He said there will be a Vulnerable Community Plan which will be drafted for the community of Manxotae. The VCP will capture their livelihoods, where they are from, their ages, statistics of families, what made them move from their places of origin etc. It will basically cover their history and where we are headed with them (future prospects).</p> <p>Mr Gopolang then opened a floor for comments and discussions.</p>
<p>COMMENTS</p>	<p>Kgosi Mou; how deep will trenches for the pipelines be? Elephants damage the pipes, so the advice is to bury the pipes deeper. Recruitment process should be transparent and do away with dodgy dealings.</p> <p>*Mr Gopolang- depth is usually about 1.5 Meters. We will forward the recommendation to the Design Engineer. Recruitment will be transparent and will advise the contractor to conduct the recruitment at the Kgotla and that labour laws will be adhered to.</p> <p>Ms Suviya; welcomed developments and could not wait until mobilisation by the contractor. Asked about the compensation process. She further encouraged members of the community to introspect on their behaviour and show commitment at the place of work, that way it will create more opportunities for them. The road divides the village into 2, so how are pipes going to be distributed on both ends?</p>

	<p>*Mr Gopolang- the engineers are on site carrying out a detailed survey on layout of the pipelines. A Community Liaison Officer will be hired to address the community's complaints. Should pipes encroach into your yard, or your house cracks, you will be compensated accordingly. A tool called Grievance Redress Mechanism will be used.</p> <p>Mr Boikanyo; Thankful for the development, the village has 3 wells so asked if they cannot be transformed into a bigger dam.</p> <p>*Mr Gopolang-construction of dams requires a good catchment area, lots of assessments and detailed engineering which means more funds, but that can also be considered as an alternative.</p> <p>Mr Mosenki; When will the project start? Before project commences, will they still be supplied water in tanks by WUC?</p> <p>*Mr Gopolang-The project is ongoing as you see us Environmental and Engineering Consultants on site. The detailed designs and assessments should be complete by December 2021, then the results of our assessments will incorporated in to the Tender documents for recruitment of contractors which should take 3-4 months.</p> <p>Mr Phorano; His main was concern shortage and saline water in the village.</p> <p>*Mr Gopolang- Concern noted and welcome.</p> <p>Ms Sphelele; where will the elevated tanks be located? And pleaded that while awaiting project, something be done to address the current water shortage.</p> <p>*Mr Gopolang- engineers are on site to determine the best location of Tanks that will ensure even distribution.</p> <p>Mr Thari; suggested that pipes should branch off at the Nata- Manxotae junction, that way maybe they would not experience low water pressure.</p> <p>*Mr Gopolang- noted and thanked him for his suggestion and will forward the suggestion to the design engineers.</p> <p>By show of hands, the community is looking forward to commencement of the project. The village has a dumping site which is not fenced. There are 10 standpipes and only 4 are working.</p>
Closing Remarks	Kgosi Mou ; Thanked all present for coming and encouraged good conduct.
Closing Prayer	Moruti

MEETING : PUBLIC CONSULTATIONS SOWA WATER SUPPLY SCHEME	
DATE: 13/10/2021	VENUE : Manxotae Kgotla
START TIME: 12:00	ADJOUNED TIME: 13:40
ITEM	KEY DISCUSSION
Opening Prayer	Mr Gobe
Introductions	Mr Chilly introduced the members of the village. Mr Gopolang also made introductions and gave a brief company overview.
Welcome Remarks	Kgosi Mokgadi; welcomed all to his kgotla and was very pleased to have everyone there.
Presentation	<p>Mr Gopolang stated that Water Utilities Corporation has engaged (Enviro Solve Consultancy (Pty) Ltd) to conduct an Environmental and Social Impact Assessment for the Sowa Water Supply Scheme which covers the villages of Kutamogoree, Moseitse, Dukwi, Sepako, Maposa, Manxotae, Nata and Sowa Town.</p> <p>Mr Gopolang stated that proposals for the upgrading of the water supply systems in the area were prepared in 2009 and 2014, but these were never implemented due to lack of funds.</p> <p>The Government of Botswana through Water Utilities Corporation (WUC) has since secured funding from the World Bank to address Botswana Emergency Water Security and Efficiency Project. The Sowa Water Supply Scheme is a sub-project under this project. Mr Gopolang said that the environmental and social policies of the World Bank require the project to conduct an Environmental and Social Impact Assessment (ESIA) in line with World Bank's Operational Policy Procedures and Standards as well as the EA Act of Botswana which require a public consultation meeting prior to any developments taking place within the project villages. The purpose of the consultation meeting is to solicit public views on the proposed project.</p> <p>Description of proposed development:</p> <p>Mr Gopolang added that the proposed works aim to optimize the existing water supply scheme to ensure adequate and reliable water supply to the population of the villages of the Sowa Cluster over a 20-year design horizon. He said that water in the cluster has been supplied from the Dukwi well field, which comprises several boreholes with different yields. The problem in the 8 villages is not lack of water per se but its loss along the pipes owing to bursts, damages by wildlife especially elephants and vandalism which then results in low supply. One other predicament is the saline water which clogs pipes hence inadequate supply.</p> <p>The scheme in use was established in the 80's and has since become outdated, therefore a revised one is needed which will run until 2041. Mr Gopolang highlighted that, it should be noted that this project will be a bulk water supply not distribution/ reticulation to homesteads.</p> <p>He said that the project is at the design stage and the preliminary designs comprise of;</p> <p>Pipelines</p> <ul style="list-style-type: none"> • Dukwi Waterworks to Dukwi East with a takeoff to Dukwi Village. • Dukwi East to Moseitse East. • Moseitse East to Kutamogoree. • Dukwi Waterworks to Nata Waterworks. • Nata Waterworks to Manxotae with a take-off to Maposa. • Manxotae to Sepako. • Dukwi Waterworks to Sowa Waterworks. <p>Pump stations, Reservoirs and Elevated tanks:</p> <ul style="list-style-type: none"> • New elevated tank at Kutamogoree.

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COMMENTS	<p>Mr Chilly; welcomed the developments and that they should be prioritised when it comes to recruitment. Majority of the population are the Basarwa therefore the VCP you are talking about has to be implemented. Asked about the qualification of the CLO. When will the project begin?</p> <p>*Mr Gopolang- CLO minimum qualification is BGCSE. The designs and assessments should be complete by December 2021, and then 3-4 months of the tendering process by contractors.</p> <p>Mr Mpofu; He is excited about the job creation opportunities and that recruitment be done at the kgotla and be inclusive of all genders. He further asked where they should raise grievances.</p> <p>*Mr Gopolang- guaranteed him that they (Consultants and the Client) shall be present throughout the project to ensure that everything goes according to plan. He assured recruitment selection will be done fairly at the kgotla. Every community will have a local CLO who will be a mediator between the client and the community. The candidate will</p>

	<p>use the Grievance Redress Mechanism; a tool which stipulates how complaints are to be addressed/resolved. Contractors in previous projects have complained about lack of dedication from the community after job enrolments, which delay the project when they have to re-hire. He pleaded with them to grab this opportunity with both hands.</p> <p>Mr Zinebeng; advised that the designs should include a tee off by before Nata village, that goes to Manxotae which could reduce costs. Thorough checks on those seeking employment for criminal record cases. Payments will be in which currency?</p> <p>*Mr Gopolang- Payments are in BWP. With regards to the pipeline from Dukwi-Nata tee-off, we will present it to the engineers to assess the alternative.</p> <p>We will also advise the contractor to vet all candidates seeking employment carefully.</p> <p>Mr Boemo; premature contract terminations are a result of difficult contractors who do not pay on time.</p> <p>* Mr Gopolang- contractor will be presented to the community at the kgotla before project commences to address issues with a common understanding.</p> <p>Mr Zibani; GBV is a serious concern in the village and he is glad World Bank recognises and takes it seriously. Lastly, he mentioned that there should be consultations with the village leadership on issues affecting the environment e.g. veldt product harvesting. Requested that the area social worker be engaged during VCP.</p> <p>*Mr Gopolang- Noted and appreciated his contribution.</p> <p>By show of hands, the community is looking forward to commencement of the project. The village has 5 standpipes but only 1 fully functions the rest are not in good condition.</p>
Closing Remarks	Councillor; Grateful for water provision and the developments the project is to bring. Thanked the community for attending.
Closing Prayer	Mr Goba;

MEETING : PUBLIC CONSULTATIONS SOWA WATER SUPPLY SCHEME	
DATE: 14/10/2021	VENUE : Nata Kgotla
START TIME: 09:00	ADJOUNED TIME: 10:20
ITEM	KEY DISCUSSION
Opening Prayer	Ms Ramontsho;
Introductions	Ms Gofamodimo; introduced the village leadership together with members of the village. Mr Gopolang then introduced us and gave a brief company overview.
Welcome Remarks	Kgosi Kgaswa welcomed everyone and explained purpose of the meeting.
Presentation	<p>Mr Gopolang stated that Water Utilities Corporation has engaged (Enviro Solve Consultancy (Pty) Ltd) to conduct an Environmental and Social Impact Assessment for the Sowa Water Supply Scheme which covers the villages of Kutamogoree, Moseitse, Dukwi, Sepako, Maposa, Manxotae, Nata and Sowa Town.</p> <p>Mr Gopolang stated that proposals for the upgrading of the water supply systems in the area were prepared in 2009 and 2014, but these were never implemented due to lack of funds.</p> <p>The Government of Botswana through Water Utilities Corporation (WUC) has since secured funding from the World Bank to address Botswana Emergency Water Security and Efficiency Project. The Sowa Water Supply Scheme is a sub-project under this project. Mr Gopolang said that the environmental and social policies of the World Bank require the project to conduct an Environmental and Social Impact Assessment (ESIA) in line with World Bank's Operational Policy Procedures and Standards as well as the EA Act of Botswana which require a public consultation meeting prior to any developments taking place within the project villages. The purpose of the consultation meeting is to solicit public views on the proposed project.</p> <p>Description of proposed development: Mr Gopolang added that the proposed works aim to optimize the existing water supply scheme to ensure adequate and reliable water supply to the population of the villages of the Sowa Cluster over a 20-year design horizon. He said that water in the cluster has been supplied from the Dukwi well field, which comprises several boreholes with different yields. The problem in the 8 villages is not lack of water per se but its loss along the pipes owing to bursts, damages by wildlife especially elephants and vandalism which then results in low supply. One other predicament is the saline water which clogs pipes hence inadequate supply.</p> <p>The scheme in use was established in the 80's and has since become outdated, therefore a revised one is needed which will run until 2041. Mr Gopolang highlighted that, it should be noted that this project will be a bulk water supply not distribution/ reticulation to homesteads. He said that the project is at the design stage and the preliminary designs comprise of;</p> <p>Pipelines</p> <ul style="list-style-type: none"> • Dukwi Waterworks to Dukwi East with a take-off to Dukwi Village. • Dukwi East to Moseitse East. • Moseitse East to Kutamogoree. • Dukwi Waterworks to Nata Waterworks. • Nata Waterworks to Manxotae with a take-off to Maposa. • Manxotae to Sepako. • Dukwi Waterworks to Sowa Waterworks. <p>Pump stations, Reservoirs and Elevated tanks:</p> <ul style="list-style-type: none"> • New elevated tank at Kutamogoree.

	<ul style="list-style-type: none"> • New pump station at Moseitse East. • New Control valve chamber at Moseitse West. • New elevated tank at Dukwi East. • New elevated tank at Dukwi Village. • New Control valve chamber at Dukwi Village. • New pump station at Dukwi Waterworks. <p>Mr Gopolang also stated the impacts as a result of the developments including air pollution due to dust, noise pollution from machinery on site. He also said that there might be cases of family break ups as a result of moral decay e.g. promiscuity as well as GBV cases. During civil works for different project activities, there might be grievances on damage to private property.</p> <p>As a mitigation plan there will be spraying of water to suppress dust, work should be done during the day to limit noise. Mr Gopolang also asked the community to air out their expected impacts and mitigations thereof as a result of the implementation of the project.</p> <p>He however said there will be a Grievance Redress Mechanism which will be aimed at addressing all grievances as a result of the implantation of the project. He also added that there will be a Community Liaison Officer from the community who will be employed to act as an intermediary between client and the community.</p> <p>Mr Gopolang also added that they (ESIA consultants) will also be present during the construction period to facilitate compliance by all.</p> <p>The positive possible impacts include employment creation; recruitment will be done at the kgotla, availability of better tasting water resulting in improvements in standard of living, supply chain effects which will bring an upgrade to the economy of the village; selling of food to contractors and provision of accommodation.</p> <p>Mr Gopolang stated that one of the operational standards of the World Bank triggers vulnerable groups and/or indigenous people; women, children, those living with disabilities and Basarwa. He said there will be a Vulnerable Community Plan which will be drafted for the community of Manxotae. The VCP will capture their livelihoods, where they are from, their ages, statistics of families, what made them move from their places of origin etc. It will basically cover their history and where we are headed with them (future prospects).</p> <p>Mr Gopolang then opened a floor for comments and discussions.</p>
COMMENTS	<p>Kgosi Rancholo; it has been years consuming saline water, our teeth have discoloured. Recruitment should be done per population; one village may need more labourers than another in terms of village size. Advised the villagers to desist from promiscuous ways. Contract terms should stipulate fines for those who terminate employment before contract completion. The village development committee must be tasked with taking care of the standpipes and be remunerated for their efforts. Project overtime rates be made clear from the onset. Make permanent route markers where pipes pass to avoid damages to pipes during renovations.</p> <p>*Mr Gopolang- Noted his contributions and assured him that the labour standards of employment will be adhered to.</p> <p>Ms Nyebe; looking forward to commencement of project. Reconnect standpipes, it helps those who cannot connect water to their homesteads.</p>

	<p>*Mr Gopolang- We will forward the recommendations to WUC to reconnect the standpipes and come up with mitigation measures to address water loss such as using tokens.</p> <p>Kgosi Kgaswa; Their health has been compromised through ingestion of brackish water. As part of the corporate social responsibility, we need a clinic and an internal road leading to the kgotla to bring dignity to the village.</p> <p>*Mr Gopolang-noted down his suggestions.</p> <p>Ms Koketso; is there a map to show where the new pipes will pass?</p> <p>*Mr Gopolang- Yes there is, but the designs are not yet finalised.</p> <p>By show of hands, the community is looking forward to commencement of the project. They want recruitment to take place at the kgotla. The village has 11 standpipes and all are not functioning.</p>
Closing Remarks	Ms Seduke; Thanked the community for attending.
Closing Prayer	Ms Kemmone;

ANNEX 2: GRIEVANCE MECHANISM MONITORING LOG

Case #	Date Claim Received	Name of Person Receiving Complaint	Where/how the complaint was received	Name & contact details of complainant (if known)	Content of the claim (include all grievances, suggestions, inquiries)	Was Receipt of Complaint Acknowledged to the Complainant? (Y/N – if yes, include date, method of communication and by whom)	Expected Decision Date	Decision Outcome (include names of participants and date of decision)	Was Decision communicated to complainant? Y/N If yes, state when and via what method of communication	Was the complainant satisfied with the decision? Y/N If no, explain why and if known, will pursue appeals procedure	Any follow up action?
									<input type="checkbox"/> Yes When _____ How: ___ via Email _____ _____ <input type="checkbox"/> No		
									<input type="checkbox"/> Yes When _____ How _____ <input type="checkbox"/> No		
									<input type="checkbox"/> Yes When _____ How _____ <input type="checkbox"/> No		

ANNEX 3: GUIDANCE FOR PREPARING SITE SPECIFIC PLAN FOR CONTRACTOR'S CAMP AND LABOURERS' CAMP

Site Selection and Location

- No Contractor's and laborers camp should be cited within a radius of 500m of the head of any borehole and should be a minimum of 10 km outside the village.
- The site should be adequately drained and slope between 3- 7 per cent
- Apply for surface rights from the Rakops Sub Land Board in consultation with the Village Development Committee and Traditional Authority
- The size or area acquired should be adequate to accommodate engineers' offices as well and avoid overcrowding.
- Complete and submit a Project Brief form to the Department of Environmental Affairs (DEA) in Serowe for them to recommend which kind of assessment to be undertaken for the camp site/s.
- Undertake assessment (if required) as recommended by DEA and obtain approval
- Limit clearing strictly to allocated size of camp/s.

- Areas outside the project site which are disturbed due to construction activities should be rehabilitated following completion of work.
- Cleared vegetation should be heaped away from the road where they cannot interfere with traffic.
- The movement of construction vehicles should be restricted to designated access routes
- Cleared vegetation should be stockpiled at an agreed location with the ECO to allow the communities to harvest or collect them in a safe environment.
 - The site/s or camp/s should be hoarded against intruders and wildlife.
 - The contractor's camp site shall be separated from the labors' camp.

Facilities to be provided at Camp site

Contractor's Camp.

- Workshop for vehicle repairs
- Storeroom
- Store are for pipes with shades/roof
- Fuel storage and dispensing
- Pipes storage areas
- Carpentry
- Welding
- Offices including that of the engineers and environmental monitoring team.
- Batching plant
- Car washing bays
- Power (Generator)
- Water (Jojo Tank)
- Sanitation facilities (Water borne using conservancy tank)
- Solid waste holding facility
- Contaminated soil remediation facility (Hospital)

The Labour's Camp

- 50 single rooms with beds made of wood/steel (Separate area for women)
- Kitchen conforming to public health standards
- Recreation facilities

- Food vending area of 30m²
- Power (Generator)
- Water (Jojo Tank)
- Sanitation facilities (Water borne using conservancy tank)
- Laundry, hand washing and bathing facilities.
- Rest room/area
- Access control

Features to Consider when Setting up the Contractors and Labors Camp:

- Every shelter in the camp shall be constructed in a manner which will provide protection against the elements.
- Each room used for sleeping purposes shall contain at least 4.6 sq. for each occupant. At least a 2.1m high of ceiling shall be provided.
- Beds or bunks and suitable storage facilities such as lockers for clothing and personal articles shall be provided in every room.
- The floor of each structure shall be constructed of concrete and kept in good repair.
- All living structures shall be provided with windows. The number of windows shall be 1/10 of the floor area.
- Common kitchen area should be provided in an enclosed and screened area.
- An adequate and convenient water supply approved by WUC shall be provided in the camps for drinking, cooking, bathing and laundry purposes an adequate water supply will be supplied at 120l/per capita/day.
- Toilet facilities adequate for the capacity of the camps shall be provided.
- Each toilet room shall be located to be accessible without any individual passing through any sleeping room. Toilets shall have a window/s or satisfactorily ventilated.
- Separate toilet rooms shall be provided for each gender. Each shall be distinctly marked “Men” and “Women” and in the local language as well or by the use of pictures or symbols. The toilet for men and women shall be separated by partitions extending from the floor to the roof or ceiling.
- The toilet should be provided at the camp in a ratio of one toilet seat to 15 persons with a minimum of two seats for any shared facility.
- Each toilet shall be lighted naturally or artificially by a safe type of lighting at all hours of the day and night.
- As adequate supply of toilet paper shall be provided.
- Toilet rooms shall be kept in sanitary conditions at all times.
- A shower head shall be provided for every 10 people
- Facilities for drying clothes may be provided.
- Each habitable room shall be provided with lighting.
- Locks should be provided to each door. However, no room doors should be fitted with one way locks to prevent workers being trapped inside rooms in the event of an emergency.
- Shall appoint a labours’ Camp Superintendent who is to be trained to oversee the management of the camp and as well report any incidence of person with a communicable disease within the camp. The superintendent should be multi-lingual and speak at least one of the local languages.
- Generators should be on stable ground with clearances, ventilation and fenced with mesh wires.
- Camp closure and rehabilitation should carefully be thought out in consultation with the authorities and leaders of the settlement.
- A well-constructed temporary waste holding facility comprising of a roof, gate and side protection using nets should be provided within the confines of the construction camp site to store all solid wastes such as cement bags and plastic wrappings that would be generated not only during preconstruction phase but throughout project implementation. The waste collection area should be clearly marked.
- A soil hospital consisting of two partitions should be constructed to store and treat contaminated soil. The bounded area floor should be paved and the facility roofed. The soil hospital wall should be at least 1m high and should be covered at the top. This facility should be approved by Department of Waste Management and Pollution Control.

- Purchase of waste bags and colour coded bins or waste receptacles for use within and around the construction camp site and offices.
- The waste bins should be conveniently placed so as to be easily accessible to all the residents of the camp.
- The construction camp and engineer's office should be provided with a waterborne toilet connected to a conservancy tank. The capacity of the conservancy tank should be adequate enough to cater for the two facilities. These should be emptied periodically depending on how long it takes to fill
- A vehicle should be dedicated to collecting and disposing of solid waste to the nearest dumping site or landfill.
- Purchase and installation of fire extinguishers at workshop, fuel filling points and offices
- Open fire cooking should be discouraged. No cooking is allowed in rooms.
- The perimeter of the construction camp and office should be graded to provide a firebreak of at least 5m between the camp site and the surrounding area.
- Workers should be educated on good housekeeping rules to prevent fire outbreaks.
- A Jojo tank permanently filled with water should be placed within the construction camp and connected to hosepipe to deal with any fire emergency within the camp and site perimeter
- Harness all the existing HIV/AIDS programs and integrate them into the HIV/AIDS programme for the construction of the project. It will be important that the contractor liaise with the local AIDS Co-ordinating Office to set up an effective HIV/AIDS prevention programme for the workers.
- Sensitize workers on a monthly basis on the risks associated with contracting HIV/AIDS.
- Consult with District (local) stakeholders e.g. Clinics, HIV/AIDS Coordinators in the District or Sub-district and ensure alignment with national HIV/AIDS Policy and District or Sub-district HIV/AIDS programs.
- Recruit labour work force from within beneficiary communities so that the majority of the workforce is not separated from their families during the construction period.
- Give women equal opportunity when hiring labour s this could help address the problem of younger women getting into relationships for financial support and being abused in that process.
- Potential health outbreaks should be monitored and measures taken to prevent spread

Fire Safety

- Open fires/burning are strictly prohibited
- Fire prevention and firefighting /control facilities are to be provided particularly in the kitchens
- The camp must have the appropriate firefighting equipment as required by local authorities.
- Maintain a safe distance between buildings and consider the prevailing wind direction.
- Place firefighting equipment including fire extinguishers and a fire horn in one or more muster stations in a central location(s).
- Place fire extinguishers in a strategic location – near the exit of structures.
- Locate extinguishers in the office and kitchen tents, sleeping tents, the incineration site, generator enclosures, drill shack, fueling locations and fuel storage areas and in vehicles. Fire extinguishers should be the appropriate size to fight a potential fire.
- Periodically hold practice for fire drills.
- Allocate parking for vehicles so there are two exit routes whenever possible.
- Construct firebreaks around camp site/s. The firebreak should be 10 meters wide.

Fuels and Fuel Handling

- Fuel storage of more than 23,000 liters will require an environmental impact assessment
- Fuel storage should be bunded at 110 per cent to contain spillages
- Keep appropriate spill kits where fuel spills may occur.
- Store each type of fuel in a separate cache; it is important not to mix different types of fuels.
- Fuel storage and dispensers should be paved with concrete
- Fuel drums should be stored in a secondary containment system, which should be rated for diesel
- Post signs that clearly prohibit smoking and open flames in fuel storage and handling areas.

Fuel Handling

- Handle fuel carefully to prevent accidents including fires, spills and fuel contamination.
- Employees who handle fuel should receive appropriate training in handling fuel and transportation of dangerous goods.
- Keep appropriate spill kits at fueling sites or stations and take precautions to prevent injury and environmental damage.
- Wear PPE: Wear safety glasses or goggles and gloves. When drums are under pressure from sun exposure, the bungs may come off unexpectedly and the contents may splash out. Fuel drum placement.
- Once a drum is opened and partially used, it is very important to replace and securely tighten the bungs.
- Store a drum in use in an inclined position (preferably 60-70° from the vertical).

First Aid

The contractor is required to provide an adequate level of first aid resources within the camp, including first aid staff, equipment and supplies. Injuries and illnesses usually happen suddenly and often they are unexpected. Because medical aid may be many hours away, the presence of well-trained personnel and adequate first aid resources are essential. First aid providers should have the appropriate required level of training

Waste Management

The camps and their surroundings shall be maintained in a clean and sanitary condition free from rubbish, garbage or other refuse.

The contractor should determine how waste products are handled – whether they are recycled or subject to various treatment and disposal options.

- Recycle as much waste as possible and consider donating safe materials that might otherwise be disposed of as waste for public use.
- Purchase of mobile toilets for workers. The ratio of toilets to workers should be 1:25 in compliance with Factories Act regulation on Sanitation.
- Purchase of waste bags and colour coded bins or waste receptacles for use within and around the construction camp site and offices.
- The waste bins should be conveniently placed so as to be easily accessible to all the residents of the camp.
- The camp sites should be provided with waterborne toilet connected to a conservancy tank. The capacity of the conservancy tank should be adequate enough to cater for the two facilities. These should be emptied periodically depending on how long it takes to fill
- A vehicle should be dedicated to collecting and disposing of solid waste to the nearest dumping site or landfill.

Security /Wildlife

- Train all workers to avoid provocation wildlife when they are in contact
- Train workers to avoid poaching
- Hoard/ fence the camp sites
- Control access into the camp sites by engaging security offices.
- Provide a 10m fire break around the perimeter of the camps
- Provide signs for site rules
- Provide security at gate and monitor entry and exist of the camp

Access to Camp Site

- Provide access to the camp sites with roads of minimum reserve of 6m.

ANNEX 4: CONTRACT CLAUSES TO BE INCLUDED IN CONTRACTOR'S AGREEMENTS AND CODES OF CONDUCT (SITE SPECIFIC CODE OF CONDUCT)

The rules, including specific prohibitions and construction management measures, should be incorporated into all relevant bidding documents, contracts, and work orders.

Prohibitions: The following activities should be prohibited on or near the project site:

- Cutting of trees for any reason outside the approved construction area
- Hunting, fishing, wildlife capture, or plant collection
- Use of unapproved toxic materials
- Disturbance to anything with architectural or historical value
- Setting of fires
- Use of firearms (except authorized security guards)
- Use of alcohol or drugs by workers
- Employment of children in accordance with international law and the Children's Act.

Construction Management Measures:

Waste Management:

- Minimize the production of waste that must be treated or eliminated.
- Identify and classify the type of waste generated. If hazardous wastes are generated, proper procedures must be taken regarding their storage, collection, transportation and disposal.
- Identify and demarcate disposal areas clearly indicating the specific materials that can be deposited in each.
- Control placement of all construction waste (including earth cuts) to approved disposal sites. Dispose in authorized areas all of garbage, metals, used oils, and excess material generated during construction, incorporating recycling systems and the separation of materials.
- Establish and enforce daily site clean-up procedures, including maintenance of adequate disposal facilities for construction debris.

Maintenance:

- Ensure that all equipment maintenance activities, including oil changes, are conducted within demarcated maintenance areas; never dispose spent oils on the ground, in water courses, drainage canals or in sewer systems.
- Identify, demarcate and enforce the use of within-site access routes to limit impact to site vegetation.

Labour health and safety:

- Place signs and lighting at strategic locations informing community before works starts.
- Conduct safety training for construction workers prior to beginning work.
- Provide personal protective equipment and clothing (goggles, gloves, respirators, dust masks, hard hats, steel-toed boots etc.,) for construction workers and enforce their use.
- During heavy rains or emergencies of any kind, suspend all work.
- Safely store hazardous items away from the public.
- Educate on risks and prevention of STD/STIs and GBV, SEA, SH AND VAC
- Erect Speed bumps and speed limits.
- Cover up trucks transporting sand and gravel

Community Safety during Construction:

The Contractor's responsibilities include the protection of every person (workers and the public) and nearby property from construction accidents. The Contractor shall be responsible for complying with all national and local safety requirements and any other measures necessary to avoid accidents, including the following:

- Carefully and clearly mark pedestrian-safe access routes.
- If school children are in the vicinity, include traffic safety personnel to direct traffic.
- Keep the public away from construction sites

Nuisance and dust control should include:

- Maintain all construction-related traffic at minimum
- Maintain equipment and machinery to reduce noise
- In sensitive areas (including residential neighbourhoods, health centres, schools) more strict measures may need to be implemented to prevent undesirable noise levels, including controlled working times
- Minimize production of dust and particulate materials at all times, to avoid impacts on surrounding families and businesses
- Spray water as needed on dirt roads, cut areas and soil stockpiles or fill material.
- Apply proper measures to minimize disruptions from vibration or noise coming from construction activities.

Community Relations:

To enhance adequate community relations, the Contractor should:

- Inform the population about construction and work schedules, interruption of services, traffic detour routes as appropriate and inform the community about lodging grievances as per the GM.
- Avoid construction activities at night.

Environmental and Social Supervision during Construction

The bidding documents should indicate how compliance with environmental rules and design specifications would be supervised, along with the penalties for noncompliance by contractors or workers. Construction supervision requires oversight of compliance with the ESMP by the contractor or his designated environmental supervisor.

The "*Codes of Conduct and Action Plan for Implementing ESHS and OHS Standards, and Preventing Gender Based Violence (GBV) and Violence Against Children (VAC)*" should be included in contracts and including procedures for reporting GBV.

Ensure accuracy of and keep all records of correspondence between the contractors and project supervisors should be included in contracts.

The bidding documents should all indicate that contractor will familiarize himself/herself with the GM and inform project workers about grievance procedures.

ANNEX 5: CODES OF CONDUCT AND ACTION PLAN FOR IMPLEMENTING ESHS AND OHS STANDARDS, AND PREVENTING GENDER BASED VIOLENCE AND VIOLENCE AGAINST CHILDREN

1. Background

The purpose of these *Codes of Conduct and Action Plan for Implementing ESHS and OHS Standards, and Preventing Gender Based Violence (GBV) and Violence Against Children (VAC)* is to introduce a set of key definitions, core Codes of Conduct, and guidelines that:

- i. clearly define obligations on all project staff (including sub-contractors and day workers) with regard to implementing the project's environmental, social, health and safety (ESHS) and occupational health and safety (OHS) requirements, and;
- ii. help prevent, report and address GBV, SEA, SH and VAC within the work site and in its immediate surrounding communities.

The application of these Codes of Conduct will help ensure the project meets its ESHS and OHS objectives, as well as preventing and/or mitigating the risks of GBV, SEA, SH and VAC on the project and in the local communities.

These Codes of Conduct are to be adopted by those working on the project and are meant to:

- i. create awareness of the ESHS and OHS expectations on the project;
- ii. create common awareness about GBV, SEA, SH and VAC and:
 - (a) ensure a shared understanding that they have no place in the project; and,
 - (b) create a clear system for identifying, responding to, and sanctioning GBV, SEA, SH and VAC incidents.

Ensuring that all project staff understand the values of the project, understand expectations for all employees, and acknowledge the consequences for violations of these values, will help to create smoother, more respectful and productive project implementation thereby helping ensure that the project's objectives will be achieved.

2. Definitions

The following definitions apply:

Environmental, Social, Health and Safety (ESHS): an umbrella term covering issues related to the impact of the project on the environment, communities and workers.

Occupational Health and Safety (OHS): Occupational health and safety is concerned with protecting the safety, health and welfare of people engaged in work or employment. The enjoyment of these standards at the highest levels is a basic human right that should be accessible by each worker.

Gender-Based Violence (GBV): is an umbrella term for any harmful act that is perpetrated against a person's will and **that is based on socially ascribed (i.e. gender) differences between males and females**. It includes acts that inflict physical, sexual or mental harm or suffering, threats of such acts, coercion, and other deprivations of liberty. These acts can occur in public or in private. The term GBV is used to underscore systemic inequality between males and females (which exists in every society in the world) and acts as a unifying and foundational characteristic of most forms of violence perpetrated against women and girls. The 1993 United Nations Declaration on the Elimination of Violence against Women defines violence against women as "any act of

gender-based violence that results in, or is likely to result in, physical, sexual or psychological harm or suffering to women.”¹⁸ The six core types of GBV are:

- **Rape:** non-consensual penetration (however slight) of the vagina, anus or mouth with a penis, other body part, or an object.
- **Sexual Assault:** any form of non-consensual sexual contact that does not result in or include penetration. Examples include: attempted rape, as well as unwanted kissing, fondling, or touching of genitalia and buttocks.
 - **Sexual Harassment:** is unwelcome sexual advances, requests for sexual favours, and other verbal or physical conduct of a sexual nature. Sexual harassment is not always explicit or obvious, it can include implicit and subtle acts but always involves a power and gender dynamic in which a person in power uses their position to harass another based on their gender. Sexual conduct is unwelcome whenever the person subjected to it considers it unwelcome (e.g. looking somebody up and down; kissing, howling or smacking sounds; hanging around somebody; whistling and catcalls; in some instances, giving personal gifts).
 - **Sexual Favours** is a form of sexual harassment and includes making promises of favourable treatment (e.g. promotion) or threats of unfavourable treatment (e.g. loss of job) dependent on sexual acts—or other forms of humiliating, degrading or exploitative behaviour.
- **Physical Assault:** an act of physical violence that is not sexual in nature. Examples include: hitting, slapping, choking, cutting, shoving, burning, shooting or use of any weapons, acid attacks or any other act that *results* in pain, discomfort or injury.
- **Forced Marriage:** the marriage of an individual against her or his will.
- **Denial of Resources, Opportunities or Services:** denial of rightful access to economic resources/assets or livelihood opportunities, education, health or other social services (e.g. a widow prevented from receiving an inheritance, earnings forcibly taken by an intimate partner or family member, a woman prevented from using contraceptives, a girl prevented from attending school, etc.).
Psychological / Emotional Abuse: infliction of mental or emotional pain or injury. Examples include: threats of physical or sexual violence, intimidation, humiliation, forced isolation, stalking, harassment, unwanted attention, remarks, gestures or written words of a sexual and/or menacing nature, destruction of cherished things, etc.

Violence Against Children (VAC): is defined as physical, sexual, emotional and/or psychological harm, neglect or negligent treatment of minor children (i.e. under the age of 18), including exposure to such harm,¹⁹ that results in actual or potential harm to the child’s health, survival, development or dignity in the context of a relationship of responsibility, trust or power. This includes using children for profit, labour²⁰, sexual gratification, or some other personal or financial advantage. This also includes other activities such as using computers, mobile phones, video and digital cameras or any other medium to exploit or harass children or to access child pornography.

Grooming: are behaviours that make it easier for a perpetrator to procure a child for sexual activity. For example, an offender might build a relationship of trust with the child, and then seek to sexualize that relationship (for example by encouraging romantic feelings or exposing the child to sexual concepts through pornography).

Online Grooming: is the act of sending an electronic message with indecent content to a recipient who the sender believes to be a minor, with the intention of procuring the recipient to engage in or submit to sexual activity with another person, including but not necessarily the sender.²¹

¹⁸ It is important to note that women and girls disproportionately experience violence; overall 35 percent of women worldwide have faced physical or sexual violence (WHO, Global and regional estimates of violence against women: prevalence and health effects of intimate partner violence and non-partner sexual violence, 2013). Some men and boys also face violence based on their gender and unequal power relationships.

¹⁹ Exposure to GBV is also considered VAC.

²⁰ The employment of children must comply with all relevant local legislation, including labour laws in relation to child labour and World Bank’s safeguard policies on child labour and minimum age. They must also be able to meet the project’s Occupational Health and Safety competency standards.

Accountability Measures: are the measures put in place to ensure the confidentiality of survivors and to hold contractors, consultants and the client responsible for instituting a fair system of addressing cases of GBV, SEA, SH and VAC.

Contractors Environmental and Social Management Plan (CESMP): the plan prepared by the contractor outlining how they will implement the works activities in accordance with the project's environmental and social management plan (ESMP).

Child: is used interchangeably with the term 'minor' and refers to a person under the age of 18. This is in accordance with Article 1 of the United Nations Convention on the Rights of the Child.

Child Protection (CP): is an activity or initiative designed to protect children from any form of harm, particularly arising from VAC.

Consent: is the informed choice underlying an individual's free and voluntary intention, acceptance or agreement to do something. No consent can be found when such acceptance or agreement is obtained using threats, force or other forms of coercion, abduction, fraud, deception, or misrepresentation. In accordance with the United Nations Convention on the Rights of the Child, the World Bank considers that consent cannot be given by children under the age of 18, even if national legislation of the country into which the Code of Conduct is introduced has a lower age.²² Mistaken belief regarding the age of the child and consent from the child is not a defence.

Consultant: is as any firm, company, organization or other institution that has been awarded a contract to provide consulting services to the project and has hired managers and/or employees to conduct this work.

Contractor: is any firm, company, organization or other institution that has been awarded a contract to conduct infrastructure development works for the project and has hired managers and/or employees to conduct this work. This also includes sub-contractors hired to undertake activities on behalf of the contractor.

Employee: is any individual offering labour to the contractor or consultant within country on or off the work site, under a formal or informal employment contract or arrangement, typically, but not necessarily (e.g. including unpaid interns and volunteers), in exchange for a salary, with no responsibility to manage or supervise other employees.

GBV, SEA, SH and VAC Allegation Procedure: is the prescribed procedure to be followed when reporting incidents of GBV, SEA, SH and VAC.

GBV, SEA, SH and VAC Codes of Conduct: The Codes of Conduct adopted for the project covering the commitment of the company, and the responsibilities of managers and individuals with regards to GBV, SEA, SH and VAC.

GBV, SEA, SH and VAC Compliance Team (GCCT): a team established by the project to address GBV, SEA, SH and VAC issues.

Grievance Redress Mechanism (GM): is the process established by a project to receive and address complaints.

Manager: is any individual offering labour to the contractor or consultant, on or off the work site, under a formal or informal employment contract and in exchange for a salary, with responsibility to control or direct

²² For example, under Article 97 Criminal consolidation act for age of legal consent in Vanuatu, sexual activity with any child under the age of 15 years for heterosexual conduct and 18 years for same sex conduct is prohibited (<http://tinyurl.com/vu-consent>). However, the World Bank follows the United Nations for the age of consent (18 years) so this applies on World Bank financed projects.

the activities of a contractor's or consultant's team, unit, division or similar, and to supervise and manage a pre-defined number of employees.

Perpetrator: the person(s) who commit(s) or threaten(s) to commit an act or acts of GBV, SEA, SH and VAC.

Response Protocol: is the mechanisms set in place to respond to cases of GBV, SEA, SH and VAC (see Section 4.7 Response Protocol).

Survivor/Survivors: the person(s) adversely affected by GBV, SEA, SH and VAC. Women, men and children can be survivors of GBV; children can be survivors of VAC.

Work Site: is the area in which infrastructure development works are being conducted, as part of the project. Consulting assignments are considered to have the areas in which they are active as their work sites.

Work Site Surroundings: is the 'Project Area of Influence' which are any area, urban or rural, directly affected by the project, including all human settlements found on it.

3. Codes of Conduct

This chapter presents three Codes of Conduct for use:

- i. **Company Code of Conduct:** Commits the company to addressing GBV, SEA, SH and VAC issues;
- ii. **Manager's Code of Conduct:** Commits managers to implementing the Company Code of Conduct, as well as those signed by individuals; and,
- iii. **Individual Code of Conduct:** Code of Conduct for everyone working on the project, including managers.

ANNEX 6: COMPANY CODE OF CONDUCT

Implementing ESHS and OHS Standards

Preventing Gender Based Violence (GBV), Sexual Exploitation (SEA), Sexual Harassment (SH) and Violence Against Children (VAC)

The company is committed to ensuring that the project is implemented in such a way which minimizes any negative impacts on the local environment, communities, and its workers. This will be done by respecting the environmental, social, health and safety (ESHS) standards, and ensuring appropriate occupational health and safety (OHS) standards are met. The company is also committed to creating and maintaining an environment in which gender-based violence (GBV) and violence against children (VAC) have no place, and where they will not be tolerated by any employee, sub-contractors, supplier, associate, or representative of the company.

Therefore, to ensure that all those engaged in the project are aware of this commitment, the company commits to the following core principles and minimum standards of behaviour that will apply to all company employees, associates, and representatives, including sub-contractors and suppliers, without exception:

General

1. The company—and therefore all employees, associates, representatives, sub-contractors and suppliers—commits to complying with all relevant national laws, rules and regulations.
2. The company commits to full implementing its 'Contractors Environmental and Social Management Plan' (CESMP).
3. The company commits to treating women, children (persons under the age of 18), and men with respect regardless of race, colour, language, religion, political or other opinion, national, ethnic or social origin, property, disability, birth or other status. Acts of GBV, SEA, SH and VAC are in violation of this commitment.
4. The company shall ensure that interactions with local community members are done with respect and non-discrimination.
5. Demeaning, threatening, harassing, abusive, culturally inappropriate, or sexually provocative language and behaviour are prohibited among all company employees, associates, and its representatives, including sub-contractors and suppliers.
6. The company will follow all reasonable work instructions (including regarding environmental and social norms).
7. The company will protect and ensure proper use of property (for example, to prohibit theft, carelessness or waste).

Health and Safety

8. The company will ensure that the project's occupational health and safety (OHS) Management Plan is effectively implemented by company staff, as well as sub-contractors and suppliers.
9. The company will ensure that all people's on-site wear prescribed and appropriate personal protective equipment, preventing avoidable accidents and reporting conditions or practices that pose a safety hazard or threaten the environment.
10. The company will:
 - i. prohibit the use of alcohol during work activities.
 - ii. prohibit the use of narcotics or other substances which can impair faculties at all times.
11. The company will ensure that adequate sanitation facilities are available on site and at any worker accommodations provided to those working on the project.

Gender Based Violence, Sexual Exploitation and Abuse, Sexual Harassment and Violence Against Children

12. Acts of GBV, SEA, SH and VAC constitute gross misconduct and are therefore grounds for sanctions, which may include penalties and/or termination of employment, and if appropriate referral to the Police for further action.
13. All forms of GBV, SEA, SH and VAC, including grooming are unacceptable, regardless of whether they take place on the work site, the work site surroundings, at worker's camps or within the local community.
 - i. Sexual Harassment—for instance, making unwelcome sexual advances, requests for sexual favours, and other verbal or physical conduct, of a sexual nature, including subtle acts of such behaviour, is prohibited.
 - ii. Sexual favours—for instance, making promises or favourable treatment dependent on sexual acts—or other forms of humiliating, degrading or exploitative behaviour are prohibited.
14. Sexual contact or activity with children under 18—including through digital media—is prohibited. Mistaken belief regarding the age of a child is not a defence. Consent from the child is also not a defence or excuse.
15. Unless there is full consent²³ by all parties involved in the sexual act, sexual interactions between the company's employees (at any level) and members of the communities surrounding the workplace are prohibited. This includes relationships involving the withholding/promise of actual provision of benefit (monetary or non-monetary) to community members in exchange for sex—such sexual activity is considered “non-consensual” within the scope of this Code.
16. In addition to company sanctions, legal prosecution of those who commit acts of GBV, SEA, SH and VAC will be pursued if appropriate.
17. All employees, including volunteers and sub-contractors are highly encouraged to report suspected or actual acts of GBV and/or VAC by a fellow worker, whether in the same company or not. Reports must be made in accordance with project's GBV, SEA, SH and VAC Allegation Procedures.
18. Managers are required to report and act to address suspected or actual acts of GBV and/or VAC as they have a responsibility to uphold company commitments and hold their direct reports responsible.

Implementation

To ensure that the above principles are implemented effectively the company commits to ensuring that:

19. All managers sign the project's 'Manager's Code of Conduct' detailing their responsibilities for implementing the company's commitments and enforcing the responsibilities in the 'Individual Code of Conduct'.
20. All employees sign the project's 'Individual Code of Conduct' confirming their agreement to comply with ESHS and OHS standards, and not to engage in activities resulting in GBV, SEA, SH and VAC.
21. Displaying the Company and Individual Codes of Conduct prominently and in clear view at workers' camps, offices, and in public areas of the workspace. Examples of areas include waiting, rest and lobby areas of sites, canteen areas and health clinics.
22. Ensure that posted and distributed copies of the Company and Individual Codes of Conduct are translated into the appropriate language of use in the work site areas as well as for any international staff in their native language.
23. An appropriate person is nominated as the company's 'Focal Point' for addressing GBV, SEA, SH and VAC issues, including representing the company on the GBV, SEA, SH and VAC Compliance Team (GCCT) which is comprised of representatives from the client, contractor(s), the supervision consultant, and local service provider(s).
24. Ensuring that an effective GBV, SEA, SH and VAC Action Plan is developed in consultation with the GCCT which includes as a minimum:

²³ **Consent** is defined as the informed choice underlying an individual's free and voluntary intention, acceptance or agreement to do something. No consent can be found when such acceptance or agreement is obtained using threats, force or other forms of coercion, abduction, fraud, deception, or misrepresentation. In accordance with the United Nations Convention on the Rights of the Child, the World Bank considers that consent cannot be given by children under the age of 18, even if national legislation of the country into which the Code of Conduct is introduced has a lower age. Mistaken belief regarding the age of the child and consent from the child is not a defense.

- i. **GBV, SEA, SH and VAC Allegation Procedure** to report GBV, SEA, SH and VAC issues through the project Grievance Redress Mechanism (Section 4.3 Action Plan);
 - ii. **Accountability Measures** to protect confidentiality of all involved (Section 4.4 Action Plan); and,
 - iii. **Response Protocol** applicable to GBV, SEA, SH and VAC survivors and perpetrators (Section 4.7 Action Plan).
25. That the company effectively implements the agreed final GBV, SEA, SH and VAC Action Plan, providing feedback to the GCCT for improvements and updates as appropriate.
26. All employees attend an induction training course prior to commencing work on site to ensure they are familiar with the company's commitments to ESHS and OHS standards, and the project's GBV, SEA, SH and VAC Codes of Conduct.
27. All employees attend a mandatory training course once a month for the duration of the contract starting from the first induction training prior to commencement of work to reinforce the understanding of the project's ESHS and OHS standards and the GBV, SEA, SH and VAC Code of Conduct.

I do hereby acknowledge that I have read the foregoing Company Code of Conduct, and on behalf of the company agree to comply with the standards contained therein. I understand my role and responsibilities to support the project's OHS and ESHS standards, and to prevent and respond to GBV, SEA, SH and VAC. I understand that any action inconsistent with this Company Code of Conduct or failure to act mandated by this Company Code of Conduct may result in disciplinary action.

Company Name: _____

Signature: _____

Printed Name: _____

Title: _____

Date: _____

ANNEX 7: MANAGER'S CODE OF CONDUCT

Implementing ESHS and OHS Standards

Preventing Gender Based Violence and Violence Against Children

Managers at all levels have a responsibility to uphold the company's commitment to implementing the ESHS and OHS standards, and preventing and addressing GBV, SEA, SH and VAC. This means that managers have an acute responsibility to create and maintain an environment that respects these standards and prevents GBV, SEA, SH and VAC. Managers need to support and promote the implementation of the Company Code of Conduct. To that end, managers must adhere to this Manager's Code of Conduct and sign the Individual Code of Conduct. This commits them to supporting the implementation of the CESMP and the OHS Management Plan and developing systems that facilitate the implementation of the GBV, SEA, SH and VAC Action Plan. They need to maintain a safe workplace, as well as a GBV-free and VAC-free environment at the workplace and in the local community. These responsibilities include but are not limited to:

Implementation

1. To ensure maximum effectiveness of the Company and Individual Codes of Conduct:
 - i. Prominently displaying the Company and Individual Codes of Conduct in clear view at workers' camps, offices, and in public areas of the workspace. Examples of areas include waiting, rest and lobby areas of sites, canteen areas and health clinics.
 - ii. Ensuring all posted and distributed copies of the Company and Individual Codes of Conduct are translated into the appropriate language of use in the work site areas as well as for any international staff in their native language.
2. Verbally and in writing explain the Company and Individual Codes of Conduct to all staff.
3. Ensure that:
 - i. All direct reports sign the 'Individual Code of Conduct', including acknowledgment that they have read and agree with the Code of Conduct.
 - ii. Staff lists and signed copies of the Individual Code of Conduct are provided to the OHS Manager, the GCCT, and the client.
 - iii. Participate in training and ensure that staff also participate as outlined below.
 - iv. Put in place a mechanism for staff to:
 - (a) report concerns on ESHS or OHS compliance; and
 - (b) confidentially report GBV, SEA, SH and VAC incidents through the Grievance Redress Mechanism (GM)
 - v. Staff are encouraged to report suspected or actual ESHS, OHS, GBV, SEA, SH and VAC issues, emphasizing the staff's responsibility to the Company and the country hosting their employment, and emphasizing the respect for confidentiality.
4. In compliance with applicable laws and to the best of your abilities, prevent perpetrators of sexual exploitation and abuse from being hired, re-hired or deployed. Use background and criminal reference checks for all employees.
5. Ensure that when engaging in partnership, sub-contractor, supplier or similar agreements, these agreements:
 - i. Incorporate the ESHS, OHS, GBV, SEA, SH and VAC Codes of Conduct as an attachment.
 - ii. Include the appropriate language requiring such contracting entities and individuals, and their employees and volunteers, to comply with the Individual Codes of Conduct.
 - iii. Expressly state that the failure of those entities or individuals, as appropriate, to ensure compliance with the ESHS and OHS standards, take preventive measures against GBV, SEA, SH and VAC, to investigate allegations thereof, or to take corrective actions when GBV, SEA, SH and VAC has occurred, shall not only constitute grounds for sanctions and penalties in accordance with the Individual Codes of Conduct but also termination of agreements to work on or supply the project.
6. Provide support and resources to the GCCT to create and disseminate internal sensitization initiatives through the awareness-raising strategy under the GBV, SEA, SH and VAC Action Plan.
7. Ensure that any GBV, SEA, SH and VAC issue warranting Police action is reported to the Police, the client and the World Bank immediately.

8. Report and act according to the response protocol (Section 4.7 Response Protocol) any suspected or actual acts of GBV and/or VAC as managers have a responsibility to uphold company commitments and hold their direct reports responsible.
9. Ensure that any major ESHS or OHS incidents are reported to the client and the supervision engineer immediately.

Training

10. The managers are responsible to:
 - i. Ensure that the OHS Management Plan is implemented, with suitable training required for all staff, including sub-contractors and suppliers; and,
 - ii. Ensure that staff have a suitable understanding of the CESMP and are trained as appropriate to implement the CESMP requirements.
11. All managers are required to attend an induction manager training course prior to commencing work on site to ensure that they are familiar with their roles and responsibilities in upholding the GBV, SEA, SH and VAC elements of these Codes of Conduct. This training will be separate from the induction training course required of all employees and will provide managers with the necessary understanding and technical support needed to begin to develop the GBV, SEA, SH and VAC Action Plan for addressing GBV, SEA, SH and VAC issues.
12. Managers are required to attend and assist with the project facilitated monthly training courses for all employees. Managers will be required to introduce the trainings and announce the self-evaluations, including collecting satisfaction surveys to evaluate training experiences and provide advice on improving the effectiveness of training.
13. Ensure that time is provided during work hours and that staff prior to commencing work on site attend the mandatory project facilitated induction training on:
 - i. OHS and ESHS; and,
 - ii. GBV, SEA, SH and VAC required of all employees.
14. During civil works, ensure that staff attend ongoing OHS and ESHS training, as well as the monthly mandatory refresher training course required of all employees to combat increased risk of GBV, SEA, SH and VAC.

Response

15. Managers will be required to take appropriate actions to address any ESHS or OHS incidents.
16. With regard to GBV, SEA, SH and VAC:
 - i. Provide input to the GBV, SEA, SH and VAC Allegation Procedures (Section 4.2 Action Plan) and Response Protocol (Section 4.7 Action Plan) developed by the GCCT as part of the final cleared GBV, SEA, SH and VAC Action Plan.
 - ii. Once adopted by the Company, managers will uphold the Accountability Measures (Section 4.4 Action Plan) set forth in the GBV, SEA, SH and VAC Action Plan to maintain the confidentiality of all employees who report or (allegedly) perpetrate incidences of GBV, SEA, SH and VAC (unless a breach of confidentiality is required to protect persons or property from serious harm or where required by law).
 - iii. If a manager develops concerns or suspicions regarding any form of GBV, SEA, SH and VAC by one of his/her direct reports, or by an employee working for another contractor on the same work site, s/he is required to report the case using the GM.
 - iv. Once a sanction has been determined, the relevant manager(s) is/are expected to be personally responsible for ensuring that the measure is effectively enforced, within a maximum timeframe of 14 days from the date on which the decision to sanction was made
 - v. If a Manager has a conflict of interest due to personal or familial relationships with the survivor and/or perpetrator, he/she must notify the respective company and the GCCT. The Company will be required to appoint another manager without a conflict of interest to respond to complaints.
 - vi. Ensure that any GBV, SEA, SH and VAC issue warranting Police action is reported to the Police, the client and the World Bank immediately

17. Managers failing address ESHS or OHS incidents or failing to report or comply with the GBV, SEA, SH and VAC provisions may be subject to disciplinary measures, to be determined and enacted by the company's CEO, Managing Director or equivalent highest-ranking manager. Those measures may include:
 - i. Informal warning.
 - ii. Formal warning.
 - iii. Additional Training.
 - iv. Loss of up to one week's salary.
 - v. Suspension of employment (without payment of salary), for a minimum period of 1 month up to a maximum of 6 months.
 - vi. Termination of employment.
18. Ultimately, failure to effectively respond to ESHS, OHS, GBV, SEA, SH and VAC cases on the work site by the company's managers or CEO may provide grounds for legal actions by authorities.

I do hereby acknowledge that I have read the foregoing Manager's Code of Conduct, do agree to comply with the standards contained therein and understand my roles and responsibilities to prevent and respond to ESHS, OHS, GBV, SEA, SH and VAC requirements. I understand that any action inconsistent with this Manager's Code of Conduct or failure to act mandated by this Manager's Code of Conduct may result in disciplinary action.

Signature: _____

Printed Name: _____

Title: _____

Date: _____

ANNEX 8: INDIVIDUAL CODE OF CONDUCT

Implementing ESHS and OHS Standards

Preventing Gender Based Violence and Violence Against Children

I, _____, acknowledge that adhering to environmental, social health and safety (ESHS) standards, following the project's occupational health and safety (OHS) requirements, and preventing gender based violence (GBV) and violence against children (VAC) is important.

The company considers that failure to follow ESHS and OHS standards, or to partake in GBV, SEA, SH and VAC activities—be it on the work site, the work site surroundings, at workers' camps, or the surrounding communities—constitute acts of gross misconduct and are therefore grounds for sanctions, penalties or potential termination of employment. Prosecution by the Police of those who commit GBV, SEA, SH and VAC may be pursued if appropriate.

I agree that while working on the project I will:

1. Attend and actively partake in training courses related to ESHS, OHS, HIV/AIDS, GBV, SEA, SH and VAC as requested by my employer.
2. Will always wear my personal protective equipment (PPE) when at the work site or engaged in project related activities.
3. Take all practical steps to implement the contractor's environmental and social management plan (CESMP).
4. Implement the OHS Management Plan.
5. Adhere to a zero-alcohol policy during work activities, and refrain from the use of narcotics or other substances which can impair faculties at all times.
6. Consent to Police background check.
7. Treat women, children (persons under the age of 18), and men with respect regardless of race, colour, language, religion, political or other opinion, national, ethnic or social origin, property, disability, birth or other status.
8. Not use language or behaviour towards women, children or men that is inappropriate, harassing, abusive, sexually provocative, demeaning or culturally inappropriate.
9. Not engage in sexual harassment—for instance, making unwelcome sexual advances, requests for sexual favours, and other verbal or physical conduct, of a sexual nature, including subtle acts of such behaviour (e.g. looking somebody up and down; kissing, howling or smacking sounds; hanging around somebody; whistling and catcalls; giving personal gifts; making comments about somebody's sex life; etc.).
10. Not engage in sexual favours—for instance, making promises or favourable treatment dependent on sexual acts—or other forms of humiliating, degrading or exploitative behaviour.
11. Not participate in sexual contact or activity with children—including grooming or contact through digital media. Mistaken belief regarding the age of a child is not a defence. Consent from the child is also not a defence or excuse.
12. Unless there is the full consent²⁴ by all parties involved, I will not have sexual interactions with members of the surrounding communities. This includes relationships involving the withholding or promise of actual provision of benefit (monetary or non-monetary) to community members in exchange for sex—such sexual activity is considered “non-consensual” within the scope of this Code.
13. Consider reporting through the GM or to my manager any suspected or actual GBV, SEA, SH and VAC by a fellow worker, whether employed by my company or not, or any breaches of this Code of Conduct.

With regard to children under the age of 18:

²⁴ **Consent** is defined as the informed choice underlying an individual's free and voluntary intention, acceptance or agreement to do something. No consent can be found when such acceptance or agreement is obtained using threats, force or other forms of coercion, abduction, fraud, deception, or misrepresentation. In accordance with the United Nations Convention on the Rights of the Child, the World Bank considers that consent cannot be given by children under the age of 18, even if national legislation of the country into which the Code of Conduct is introduced has a lower age. Mistaken belief regarding the age of the child and consent from the child is not a defense.

14. Wherever possible, ensure that another adult is present when working in the proximity of children.
15. Not invite unaccompanied children unrelated to my family into my home, unless they are at immediate risk of injury or in physical danger.
16. Not use any computers, mobile phones, video and digital cameras or any other medium to exploit or harass children or to access child pornography (see also "Use of children's images for work related purposes" below).
17. Refrain from physical punishment or discipline of children.
18. Refrain from hiring children for domestic or other labour below the minimum age of 14 unless national law specifies a higher age, or which places them at significant risk of injury.
19. Comply with all relevant local legislation, including labour laws in relation to child labour and World Bank's safeguard policies on child labour and minimum age.
20. Take appropriate caution when photographing or filming children (See Annex 2 for details).

Use of children's images for work related purposes

When photographing or filming a child for work related purposes, I must:

21. Before photographing or filming a child, assess and endeavour to comply with local traditions or restrictions for reproducing personal images.
22. Before photographing or filming a child, obtain informed consent from the child and a parent or guardian of the child. As part of this I must explain how the photograph or film will be used.
23. Ensure photographs, films, videos and DVDs present children in a dignified and respectful manner and not in a vulnerable or submissive manner. Children should be adequately clothed and not in poses that could be seen as sexually suggestive.
24. Ensure images are honest representations of the context and the facts.
25. Ensure file labels do not reveal identifying information about a child when sending images electronically.

Sanctions

I understand that if I breach this Individual Code of Conduct, my employer will take disciplinary action which could include:

1. Informal warning.
2. Formal warning.
3. Additional Training.
4. Loss of up to one week's salary.
5. Suspension of employment (without payment of salary), for a minimum period of 1 month up to a maximum of 6 months.
6. Termination of employment.
7. Report to the Police if warranted.

I understand that it is my responsibility to ensure that the environmental, social, health and safety standards are met. That I will adhere to the occupational health and safety management plan. That I will avoid actions or behaviours that could be construed as GBV, SEA, SH and VAC. Any such actions will be a breach this Individual Code of Conduct. I do hereby acknowledge that I have read the foregoing Individual Code of Conduct, do agree to comply with the standards contained therein and understand my roles and responsibilities to prevent and respond to ESHS, OHS, GBV, SEA, SH and VAC issues. I understand that any action inconsistent with this Individual Code of Conduct or failure to act mandated by this Individual Code of Conduct may result in disciplinary action and may affect my ongoing employment.

Signature: _____
 Printed Name: _____
 Title: _____
 Date: _____

ANNEX 9: GBV, SEA, SH, AND VAC ACTION PLAN

1. The GBV, SEA, SH and VAC Compliance Team

The project shall establish a 'GBV, SEA, SH and VAC Compliance Team' (GCCT). The GCCT will include, as appropriate to the project, at least four representatives ('Focal Points') as follows:

- i. A safeguards specialist from the client;
- ii. The occupational health and safety manager from the contractor²⁵, or someone else tasked with the responsibility for addressing GBV, SEA, SH and VAC with the time and seniority to devote to the position;
- iii. The supervision consultant; and,
- iv. A representative from a local service provider with experience in GBV, SEA, SH and VAC (the 'Service Provider').

It will be the duty of the GCCT with support from the management of the contractor to inform workers about the activities and responsibilities of the GCCT. To effectively serve on the GCCT, members must undergo training by the local service provider prior to the commencement of their assignment to ensure that they are sensitized on GBV and Child Protection.

The GCCT will be required to:

- i. Approve any changes to the **GBV, SEA, SH and VAC Codes of Conduct** contained in this document, with clearances from the World Bank for any such changes.
- ii. Prepare the **GBV, SEA, SH and VAC Action Plan** reflecting the Codes of Conduct which includes:
 - (a) **GBV, SEA, SH and VAC Allegation Procedures**
 - (b) **Accountability Measures**
 - (c) **An Awareness raising Strategy**
 - (d) **A Response Protocol**
- iii. Obtain approval of the GBV, SEA, SH and VAC Action Plan by the contractor's management;
- iv. Obtain client and World Bank clearances for the GBV, SEA, SH and VAC Action Plan prior to full mobilization;
- v. Receive and monitor resolutions and sanctions regarding complaints received related to GBV, SEA, SH and VAC associated with the project; and,
- vi. Ensure that GBV, SEA, SH and VAC statistics in the GM are up to date and included in the regular project reports.

The GCCT shall hold quarterly update meetings to discuss ways to strengthen resources and GBV, SEA, SH and VAC support for employees and community members.

2. Making Complaints: GBV, SEA, SH and VAC Allegation Procedures

All staff, volunteers, consultants and sub-contractors are encouraged to report suspected or actual GBV, SEA, SH and VAC cases. Managers are required to report suspected or actual GBV and/or VAC cases as they have responsibilities to uphold company commitments and they hold their direct reports accountable for complying with the Individual Code of Conduct.

The project will provide information to employees and the community on how to report cases of GBV, SEA, SH and VAC Code of Conduct breaches through the Grievance Redress Mechanism (GM). The GCCT will follow up on cases of GBV, VAC and Code of Conduct breaches reported through the GM.

²⁵ Where there are multiple contractors working on the project, each shall nominate a representative as appropriate.

3. Addressing Complaints about GBV, SEA, SH and VAC

GM

The project operates a grievance redress mechanism (GM) which is managed by a designated GM operator with the project management unit. Reports of GBV, SEA, SH and VAC, other complaints, or other concerns may be submitted online, via telephone or mail, or in person.

All complaints regarding GBV, SEA, SH and VAC must immediately be reported to the World Bank task team by the GM operator.

The GM operator will refer complaints related to GBV, SEA, SH and VAC to the GCCT to resolve them. In accordance with the GBV, SEA, SH and VAC Action Plan, the GCCT through the Service Provider and Focal Point(s) will investigate the complaint and ultimately provide the GM operator with a resolution to the complaint, or the Police if necessary. The victim's confidentiality should also be kept in mind when reporting any incidences to the Police.

The GM operator will, upon resolution, advise the complainant of the outcome, unless it was made anonymously. Complaints made to managers or the Service Provider will be referred by them to the GM for processing.

If the complaint to the GM is made by a survivor or on behalf of a survivor, the complainant will be directly referred to the service provider to receive support services while the GCCT investigates the complaint in parallel.

Service Provider

The Service Provider is a local organization which has the experience and ability to support survivors of GBV, SEA, SH and VAC. The client, the contractor(s) and consultant must establish a working relationship with the Service Provider, so that GBV, SEA, SH and VAC cases can safely be referred to them. The Service Provider will also provide support and guidance to the GBV, SEA, SH and VAC Focal Points as necessary. The Service Provider will have a representative on the GCCT and be involved in resolving complaints related to GBV, SEA, SH and VAC.

GCCT GBV, SEA, SH and VAC Focal Points

The GCCT shall confirm that all complaints related to GBV, SEA, SH and VAC have been referred to the World Bank by the GM operator.

The GCCT shall consider all GBV, SEA, SH and VAC complaints and agree on a plan for resolution. The appropriate

Focal Point will be tasked with implementing the plan (i.e. issues with contractor's staff will be for the contractor to resolve; consultant's staff the consultant; and client staff the client). The Focal Point will advise the GCCT on resolution, including referral to the Police if necessary. They will be assisted by the Service Provider as appropriate.

All the Focal Points on the GCCT must be trained and empowered to resolve GBV, SEA, SH and VAC issues. It is essential that all staff of the GM and GCCT understand the guiding principles and ethical requirement of dealing with survivors of GBV, SEA, SH and VAC. All reports should be kept confidential and referred immediately to the Service Provider represented on the GCCT²⁶. In GBV, SEA, SH and VAC cases warranting Police action, the Focal Points must appropriately refer the complaint to: (i) the authorities; (ii) the Service Provider; and, (iii) management for further action. The client and the World Bank are to be immediately notified.

²⁶ Survivors of GBV, SEA, SH and VAC may need access to Police, justice, health, psychosocial, safe shelter and livelihood services to begin on a path of healing from their experience of violence.

4. Accountability Measures

All reports of GBV, SEA, SH and VAC shall be handled in a confidential manner to protect the rights of all involved. The client, contractor and consultant must maintain the confidentiality of employees who notify any acts or threats of violence, and of any employees accused of engaging in any acts or threats of violence (unless a breach of confidentiality is required to protect persons or property from serious harm or where required by law). The contractor and consultant must prohibit discrimination or adverse action against an employee because of survivor's disclosure, experience or perceived experience of GBV, SEA, SH and VAC.

To ensure that survivors feel confident to disclose their experience of GBV, SEA, SH and VAC, they can report cases of GBV, SEA, SH and VAC through multiple channels: (i) online, (ii) phone, (iii) in-person, (iv) the local service provider, (v) the manager(s), (vi) village councils; or, (vii) the Police. To ensure confidentiality, only the service provider will be privy to information regarding the survivor. The GCCT will be the primary point of contact for information and follow up regarding the perpetrator.

5. Monitoring and Evaluation

The GCCT must monitor the follow up of cases that have been reported and maintain all reported cases in a confidential and secure location. Monitoring must collect the number of cases that have been reported and the share of them that are being managed by Police, NGOs etc.

These statistics shall be reported to the GM and the Supervision Engineer for inclusion in their reporting.

For any GBV, SEA, SH and VAC cases warranting Police action, the client and the World Bank are to be immediately notified.

6. Awareness-raising Strategy

It is important to create an Awareness-Raising Strategy with activities aimed to sensitize employees on GBV, SEA, SH and VAC on the work site and its related risks, provisions of the GBV, SEA, SH and VAC Codes of Conduct, GBV, SEA, SH and VAC Allegation Procedures, Accountability Measures and Response Protocol. The strategy will be accompanied by a timeline, indicating the various sensitization activities through which the strategy will be implemented and the related (expected) delivery dates. Awareness-raising activities should be linked with trainings provided by the Service Provider.

7. Response Protocol

The GCCT will be responsible for developing a written response²⁷ protocol to meet the project requirements, in accordance to national laws and protocols. The response protocol must include mechanisms to notify and respond to perpetrators in the workplace (See 4.9 for Perpetrator Policy and Response). The response protocol will include the GM process to ensure competent and confidential response to disclosures of GBV, SEA, SH and VAC. An employee who discloses a case of GBV, SEA, SH and VAC in the workplace shall be referred to the GM for reporting.

8. Survivor Support Measures

It is essential to appropriately respond to the survivor's complaint by respecting the survivor's choices to minimize the potential for re-traumatization and further violence against the survivor. Refer the survivor to the Service Provider to obtain appropriate support services in the community—including medical and psychosocial support, emergency accommodation, security including Police protection and livelihood support—by facilitating contact and coordination with these services. The client, contractor or consultant may, where feasible, provide

²⁷ Develop appropriate protocol for written recording of GBV issues and VAC raised in case the notes are subpoenaed. Develop processes for record keeping including activities undertaken by the GCCT.

financial and other supports to survivors of GBV, SEA, SH and VAC for these services.

If the survivor is an employee, to ensure the safety of the survivor, and the workplace in general, the client, contractor or consultant, in consultation with the survivor, will assess the risk of ongoing abuse to the survivor and in the workplace. Reasonable adjustments will be made to the survivor's work schedule and work environment as deemed necessary. The employer will provide adequate leave to survivors seeking services after experiencing violence.

9. Perpetrator Policy and Response

Encourage and accept notification through the GM from employees and community members about perpetrators in the workplace. Through the GCCT and/or the Service Provider, oversee the investigation of these grievances, ensuring procedural fairness for the accused, and within the local laws. If an employee has breached the Code of Conduct, the employer will act which could include:

- i. Undertake disciplinary action up in accordance with sanctions in the GBV, SEA, SH and VAC Codes of Conduct;
- ii. Report the perpetrator to the Police as per local legal paradigms; and/or
- iii. If feasible, provide or facilitate counselling for the perpetrator.

10. Sanctions

In accordance with the Code of Conduct, any employee confirmed as a GBV, SEA, SH and VAC perpetrator shall be considered for disciplinary measures in line with sanctions and practices as agreed in the Individual Code of Conduct. It is important to note that, for each case, disciplinary sanctions are intended to be part of a process that is entirely internal to the employer, is placed under the full control and responsibility of its managers, and is conducted in accordance with the applicable national labour legislation.

Such process is expected to be fully independent from any official investigation that competent authorities (e.g. Police) may decide to conduct in relationship to the same case, and in accordance with the applicable national law. Similarly, internal disciplinary measures that the employer's managers may decide to enact are meant to be separate from any charges or sanctions that the official investigation may result into (e.g. monetary fines, detention etc.).

Potential Procedures for Addressing GBV, SEA, SH and VAC

Accountability Measures to maintain confidentiality can be achieved through the following actions:

1. Inform all employees that confidentiality of GBV, SEA, SH AND VAC survivors' personal information is of utmost importance.
2. Provide the GCCT with training on empathetic and non-judgmental listening.
3. Take disciplinary action, including and up to dismissal, against those who breach survivor's confidentiality (this is unless a breach of confidentiality is necessary to protect the survivor or another person from serious harm, or where required by law).

GBV, SEA, SH and VAC Allegation Procedures should specify:

1. Who survivors can seek information and assistance from.
2. The process for community members and employees to lodge a complaint through the GM should there be alleged GBV, SEA, SH and VAC.
3. The mechanism for how community members and employees can escalate a request for support or notification of violence if the process for reporting is ineffective due to unavailability or non-responsiveness, or if the employee's concern is not resolved.

Financial and Other Supports to survivors can include:

1. Direct payment of medical costs.
2. Coverage of all medical costs related specifically to the incident.
3. Upfront payments for medical costs to later be recouped from the employee's health insurance.
4. Providing or facilitating access to childcare.
5. Providing security upgrades to the employee's home.
6. Providing safe transportation to access support services or to and from accommodation.

Based on the rights, needs and wishes of the survivor, survivor support measures to ensure the safety of the survivor who is an employee can include²⁸:

1. Changing the perpetrator or survivor's span of hours or pattern of hours and/or shift patterns.
2. Redesigning or changing the perpetrator or survivor's duties.
3. Changing the survivor's telephone number or email address to avoid harassing contact.
4. Relocating the survivor or perpetrator to another work site/ alternative premises.
5. Providing safe transportation to and from work for a specified period.
6. Supporting the survivor to apply for an Interim Protection Order or referring them to appropriate support.
7. Taking any other appropriate measures including those available under existing provisions for family friendly and flexible work arrangements.

Leave options for survivors that are employees can include:

1. An employee experiencing GBV should be able to request paid special leave to attend medical or psychosocial appointments, legal proceedings, relocation to safe accommodation and other activities related to GBV.
2. An employee who supports a person experiencing GBV, SEA, SH and VAC may take care givers leave, including but not limited to accompanying them to court or hospital, or to take care of children.
3. Employees who are employed in a casual capacity may request unpaid special leave or unpaid care givers leave to undertake the activities described above.
4. The amount of leave provided will be determine by the individual's situation through consultations with the employee, the management and the GCCT where appropriate.

Potential Sanctions to employees who are perpetrators of GBV, SEA, SH and VAC include:

1. Informal warning
2. Formal warning
3. Additional Training
4. Loss of up to one week's salary.
5. Suspension of employment (without payment of salary), for a minimum period of 1 month up to a maximum of 6 months.
6. Termination of employment.

Referral to the Police or other authorities as warranted

²⁸ It is critical that a survivor centered approach be adopted. The survivor should be fully involved in the decision making. Except for exceptional circumstances the perpetrator should be required to take appropriate actions to accommodate the survivor (e.g. move, change hours, etc.), rather than the survivor changing.

ANNEX 10: CHANCE FIND PROCEDURES

Chance find procedures are an integral part of the project ESMP and civil works contracts. The following is proposed in this regard:

If the Contractor discovers archaeological sites, historical sites, remains and objects, including graveyards and/ or individual graves during excavation or construction, the Contractor shall:

1. Stop the construction activities in the area of the chance find;
2. Delineate the discovered site or area;
3. Secure the site to prevent any damage or loss of removable objects. In cases of removable antiquities or sensitive remains, a night guard shall be arranged until the responsible local authorities of the Department of National Museum and Monuments take over;
4. Notify the supervisor, Project Environmental Officer, and Archeological Officer and Project Engineer who in turn will notify the responsible local authorities (Kgosi), the Botswana Police and the Department of National Museum and Monuments immediately (within 24 hours or less);
5. Responsible local authorities, the Botswana Police and the Department of National Museum and Monuments would then be in charge of protecting and preserving the site before deciding on subsequent appropriate procedures. This would require a preliminary evaluation of the findings to be performed by the archaeologist of the project. The significance and importance of the findings should be assessed according to the various criteria relevant to cultural heritage, namely the aesthetic, historic, scientific or research, social and economic values.
6. Decision on how to handle the find shall be taken by the responsible authorities and the Department of National Museum and Monuments. This could include conservation, preservation, restoration and salvage.
7. Implementation for the authority decision concerning the management of the finding shall be communicated in writing by relevant local authorities.
8. Construction work may resume only after permission is given from the responsible local authorities or the Department of National Museum and Monuments concerning safeguard of the heritage.

ANNEX 11: GUIDELINE FOR THE PREPARATION OF CONTRACTOR'S ENVIRONMENTAL AND SOCIAL MANAGEMENT PLAN (C-ESMP)

Introduction

The construction Contractor must prepare an environmental and social management plan²⁹ for the construction works of the Sowa Water Supply Scheme, to be cleared, prior to the initiation of the construction works, by WUC officers, the Environmental Site Officer (ESO) and the Resident Engineer. The Contractor's Environmental and Social Management Plan (C-ESMP) shall incorporate the directives of the World Bank Group (IFC) Environmental, Health, and Safety General Guidelines (IFC EHS Guidelines³⁰), with special attention to the IFC EHS specific guidelines on: Air Emissions and Ambient Air Quality, Wastewater and Ambient Water Quality, Hazardous Materials Management, Waste Management, Noise, Occupational Health and Safety, Physical Hazards, Personal Protective Equipment (PPE), Community Health and Safety, Life and Fire Safety (L&FS), Traffic Safety, Disease Prevention, Emergency Preparedness and Response and notably Environmental, Health, and Safety (EHS) Guidelines for Construction And Decommissioning.

The C-ESMP shall determine the set of mitigation, monitoring, and institutional measures to be taken during implementation to eliminate adverse environmental and social impacts, offset them, or reduce them to acceptable levels, considering the significant adverse environmental impacts (including those involving vulnerably populations) identified in the Environmental and Social Impact Assessment (ESIA) Report.

The C-ESMP shall:

- Describes--with technical details³¹--each mitigation measure, including the type of impact to which it relates and the conditions under which it is required (e.g., continuously or in the event of contingencies), together with designs, equipment descriptions, and operating procedures, as appropriate;
- Estimates any potential environmental impacts of these measures; and
- Provides linkage with any other mitigation plans (e.g., for involuntary resettlement Plan, health and safety management plan, vulnerable population plan) required for the project.
- The CESMP must detail the environmental monitoring to be conducted by the Contractor during construction, addressing key environmental aspects of the works, particularly the environmental impacts of the project and the effectiveness of mitigation measures.
- The monitoring section of the ESMP shall provide specific description, and technical details, of monitoring measures, including the parameters to be measured, methods to be used, sampling locations, frequency of measurements, detection limits (where appropriate), and definition of thresholds that will signal the need for corrective actions. The monitoring report content must be agreed with the Environmental Site Officer (ESO) and the Resident Engineer, prior to the initiation of the construction works.
- For mitigation and monitoring aspects, the CESMP must provide an implementation schedule for measures to be carried out as part of the construction works and coordination with overall project implementation plans. The costs for implementing the CESMP must be integrated into the total construction cost estimates.

Objectives of the C-ESMP

The Objectives of the C-ESMP are:

- Ensuring compliance with regulatory authority stipulations and guidelines which may be local, provincial, national and/or international (notably the World Bank Group Environmental, Health and Safety Guidelines);

²⁹ The management plan is sometimes known as an "action plan." The CESMP may be presented as two or three separate plans covering mitigation, monitoring, and institutional aspects, depending on Botswana legal requirements.

³⁰ The World Bank Group EHS Guidelines are available at www.ifc.org/ehsguidelines.

³¹ To be based on the Method Statements for the different works to be developed by the Constructor.

- Ensuring that there is sufficient allocation of resources on the project budget so that the scale of CESMP-related activities is consistent with the significance of project impacts;
- Verifying environmental performance through information on impacts as they occur;
- Responding to changes in project implementation not considered in the ESIA;
- Responding to unforeseen events; and
- Providing feedback for continual improvement in environmental performance.

General Scope of the C-ESMP

To achieve the above objectives, the scope of the CESMP should include the following topics:

- a) Contractor's H&S Policy Statement
- b) Institutional Arrangements – Roles and Responsibilities
 - Environmental duties of the Contractor
 - Duties of the Environmental Site Officer (ESO)
 - Environmental duties of other staff
 - Process to escalate critical hazards and incidents to the attention of the project leadership, including the Contractor's Management, the Environmental officer, the Engineer and WUC officers.
- c) Regulatory Requirements
 - Applicable legislation (national and provincial) to the construction works
 - Applicable World Bank Group Environmental Health and Safety Directives
 - Status of Permits and Permissions
- d) Environmental Training Plan
 - Key environmental management team
 - Appointment of the ESO and HSO
 - Awareness of the Responsibility
 - Content and Methodology for the Training
- e) Environmental Management During the Construction Phase – Detailing Procedures for:
 - Method Statement Preparation
 - Site Location and Contractor's Camp
 - Site Establishment (Working Areas and No-go Areas)
 - Water Supply
 - Site Clearance
 - Topsoil Conservation and Stockpiling
 - Access Roads/Haul Roads
 - Site isolation procedures
 - Workshop, Equipment Maintenance and Storage
 - Workshop
 - Equipment Maintenance and Storage
 - General Materials Handling, Use and Storage
 - Spoil Sites
 - Fuels, Oils, Hazardous Substances and other Liquid Pollutants
 - Fuels (Petrol and Diesel) and Oil
 - Hazardous Substances
 - Solid Waste Management
 - Sanitation
 - Wastewater and Contaminated Water Management
 - Storm Water Management and Erosion Control
 - Noise Control
 - Dust Control
 - Traffic Control
 - Disruption of Access to Property
 - Disruption of Services
 - Protection of Sensitive Environments and Natural Features
 - Fire Prevention and Control
 - Emergency Procedures
 - General Health and Safety Procedures
 - Diseases, Heat Stress and Wounds

- Public Liability
- Special Procedures:
 - Gender Issues.
 - Environmental, health and safety procedures for works close and/or related to the Vulnerable Communities.
 - Procedures to mitigate potential impacts due to labour Influx³², especially if the communities are rural, remote, small, or vulnerable.
 - Heavy equipment operation and transit;
 - Road blockage and crossing
 - Demolition works
 - Hard rock excavation (including blasting)
 - Access and exploitation of borrow areas
- Management and Monitoring Plans (Detailed Schedule)

³² The labour influx potential impacts were identified in a project's Environmental and Social Impact Assessment (ESIA), but may only become fully known once a contractor is appointed and decides on sourcing the required labour force.

ANNEX 12: PREPARATION OF A HEALTH AND SAFETY MANAGEMENT PLAN

Introduction

The Construction Contractor must prepare a Health and Safety Management Plan (H&SMP) for the construction of the Sowa Water Supply Scheme, to be cleared prior to the initiation of the construction works, by WUC officers, the Environmental Site Officer (ESO) and the Resident Engineer. The preparation of the H&SMP must consider the Botswana Labour, Health and Safety legislation and the World Bank Group (IFC) Environmental, Health, and Safety General Guidelines (IFC EHS Guidelines³³), with special attention to the IFC EHS specific guidelines for occupational health and safety, personal protective equipment (PPE), and for community health and safety.

The H&SMP aims to implement the policies and approaches to protect the safety and health of the construction workers, contractors, and the communities that may be affected by the construction works. The Health and Safety Management Plan (H&SMP) should adopt the principle of continuous improvement, consistent with the Occupational Health and Safety Management System (OHSAS) 18001, dated 2007, and complies with all requirements of the Botswana Health and Safety regulations. The H&SMP aims to control health and safety risks of the construction activities, addressing: policy; legal requirements; hazard identification and risk assessment; health and safety targets and objectives; roles and responsibilities; training and awareness; reporting and documentation; EHS communication; operational control; emergency preparedness and response; performance measurement and monitoring; accidents, incidents, non-conformance, and corrective/preventive actions; records and records management; audits and assurance; and management review.

A copy of the H&SMP should be available to all workers and sub-contractors, on the site, for the duration of the project. The Contractor must ensure that they can read, understand, clarify and ask questions. The Contractor may review the plan, regularly, throughout the construction and make any revisions known to those working on the project.

General Scope

To achieve the above objectives, the scope of the H&SMP should include the address the following topics:

a) Project Information

- Principal contractor details
- Details of persons at workplace with H&S responsibilities

b) Scope of Work

- Description of project
- Location of project

c) Roles and Responsibilities

- Principal contractor
- Contractors
- Workers

d) General H&S Information

- Relevant legislation
- H&S Policy Statement
- Codes of Practice and other guidance
- Relevant Codes of Practice, including (if applicable): Confined spaces, construction work, cranes, demolition work, excavation work, first aid in the workplace, formwork and falsework, hazardous manual tasks, managing work health and safety risks, labelling of workplace hazardous chemicals, managing electrical risks at the workplace, managing noise and preventing hearing loss at work, managing the risks of falls in the workplace, safe design structures, traffic management in workplaces, welding processes, work health and safety consultation, cooperation and coordination, working in the vicinity of overhead and underground electrical lines, among others.
- Insurances

e) Workers' Induction and Training

- Worker induction

³³ The World Bank Group EHS Guidelines are available at www.ifc.org/ehsguidelines.

- Worker training
- f) Risk Management
- Identification and management of hazards and risks (Detail procedures to identify hazards and assess risks before the construction works start)
- g) Hierarchy of Control³⁴
- h) High Risk Construction Works
- Description of safe work method statement (SWMS) for each of the high risk construction work activity.
- i) Licenses and Certification for High Risk Work
- Applicable licenses and certifications for workers to undertake high risk work
- j) Emergency and Incident Response
- Emergency preparedness
 - Emergency response procedures
- k) Incident Procedures
- Notifiable incidents
 - First aid
- l) Consultation and Communication
- Consultation
 - Communication
- m) Disciplinary Procedures³⁵
- n) Site Safety Procedures
- Site rules
 - Site amenities
 - Site security
 - Site signage
- o) Managing Construction Hazards specified in the Regulations, including:
- Falls from heights
 - Falling objects
 - Demolition work
 - Excavation work/trenching
 - For work near overhead power lines up to and including 133kV:
 - For excavation work near underground essential services:
 - Electrical
 - Other construction hazards
- p) Traffic Management Plan³⁶
- The contactor must identify, evaluate and monitor the potential traffic and road safety risks to workers and potentially affected communities throughout the project life cycle and, where appropriate, develop measures and plans to address them, determining road safety initiatives proportional to the scope and nature of construction activities.

³⁴ Addressing: Eliminate, Substitute, Isolate, Engineering controls, Administrative controls and Personal Protective Equipment.

³⁵ E.g, addressing first violation, second violation, third violation and serious breach of safety

³⁶ Traffic safety should be promoted by all project personnel during displacement to and from the workplace, and during operation of project equipment on private or public roads. Prevention and control of traffic related injuries and fatalities should include the adoption of safety measures that are protective of construction workers and of road users, including those who are most vulnerable to road traffic accidents. The Plan must consider implementing the following control measures to keep pedestrians and vehicles apart at the construction workplace and when vehicles enter or exit the workplace: Providing separate traffic routes for pedestrians and vehicles, where possible. Providing separate clearly marked pedestrian walkways that take a direct route. Creating pedestrian exclusion zones where powered mobile plant is operating. Creating vehicle exclusion zones for pedestrian-only areas around amenities and pedestrian entrances. Securing areas where vehicles and powered mobile plant operate by installing pedestrian barriers, traffic control barricades, chains, tape or bollards. Designating specific parking areas for workers' and visitors' vehicles outside the construction area. Providing clearly signed and well-illuminated crossing points where walkways cross roadways, so drivers and pedestrians can see each other clearly. " Using traffic controllers, mirrors, stop signs or warning devices at site exits to make sure drivers can see or are aware of pedestrians before driving out onto public roads, among others.

- Traffic management plan should be drawn and certified by a person who has proper training and certification for the task;
 - q) Ladder Safety
 - r) Manual Handling
 - s) Hand Operated and Power Tool Use
 - t) Sun Safety
 - u) Alcohol and Drug Control
 - v) Any Other Construction Hazards³⁷
-

³⁷ Note: If the contractor identifies Asbestos in any facility to be demolished and/or refurbished, it should adopt specific procedures for asbestos and follow the correct removal processes, with workers trained on the use the appropriate personal protective equipment.

ANNEX 13: THRESHOLD FOR NOISE, AIR QUALITY AND RADIATION

Noise Level Guidelines

Receptor	One hour L_{Aeq} (dBA)	
	Daytime 07:00-22:00 am	Night Time 22:00-07:00
Residential, institutional, educational	55	45
Industrial; commercial	70	70

Source: General EHS Guidelines: Environmental Noise Management.

World Health Organization (WHO) Ambient Air Quality Guidelines

	Averaging	Guideline value in
	Period	$\mu\text{g}/\text{m}^3$
Sulphur dioxide (SO ₂)	24-hour	125 (Interim target-1) 50 (Interim target-2) 20 (guideline)
	10 minute	500 (guideline)
Nitrogen dioxide (NO ₂)	1-year	40 (guideline)
	1-hour	200 (guideline)
Particulate Matter PM ₁₀	1-year	70 (Interim target-1) 50 (Interim target-2) 30 (Interim target-3) 20 (guideline)
	24-hour	150 (Interim target-1) 100 (Interim target-2) 75 (Interim target-3) 50 (guideline)
Particulate Matter PM _{2.5}	1-year	35 (Interim target-1) 25 (Interim target-2) 15 (Interim target-3) 10 (guideline)
	24-hour	

		75 (Interim target-1) 50 (Interim target-2) 37.5 (Interim target-3) 25 (guideline)
Ozone (O ₃)	8-hour daily maximum	160 (Interim target-1) 100 (guideline)

Source: General EHS Guidelines: Environmental Noise Management

Fugitive PM Emissions Controls

Control Type	Control Efficiency
Chemical Stabilization	0 per cent - 98 per cent
Hygroscopic salts	60 per cent - 96 per cent
Bitumen's/adhesives	
Surfactants	0 per cent - 68 per cent
Wet Suppression – Watering	12 per cent - 98 per cent
Speed Reduction	0 per cent - 80 per cent
Traffic Reduction	Not quantified
Paving (Asphalt / Concrete)	85 per cent - 99 per cent
Covering with Gravel, Slag, or "Road Carpet"	30 per cent - 50 per cent
Vacuum Sweeping	0 per cent - 58 per cent
Water Flushing/Broom Sweeping	0 per cent - 96 per cent

Source: General EHS Guidelines: Environmental Noise Management

Acceptable Effective Dose Limits for Workplace Radiological Hazards

Exposure	Workers (min.19 years of age)	Apprentices and students (16-18 years of age)
Five consecutive year average – Effective dose	20 mSv/year	
Single year exposure – Effective dose	50 mSv/year	6 mSv/year
Equivalent dose to the lens of the eye	150 mSv/year	50 mSv/year
Equivalent dose to the extremities (hands, feet) or the skin	500 mSv/year	150 mSv/year

Source : General EHS Guidelines: Environmental Noise Management

Summary of Recommended Personal Protective Equipment According to Hazard

Objective	Workplace Hazards	Suggested PPE
Eye and face protection	Flying particles, molten metal, liquid chemicals, gases or vapours, light radiation.	Safety glasses with side-shields, protective shades, etc.
Head protection	Falling objects, inadequate height clearance, and overhead power cords.	Plastic helmets with top and side impact protection.
Hearing protection	Noise, ultra-sound.	Hearing protectors (ear plugs or ear muffs).
Foot protection	Falling or rolling objects pointed objects. Corrosive or hot liquids.	Safety shoes and boots for protection against moving & falling objects, liquids and chemicals.
Hand protection	Hazardous materials, cuts or lacerations, vibrations, extreme temperatures.	Gloves made of rubber or synthetic materials (Neoprene), leather, steel, insulating materials, etc.
Respiratory protection	Dust, fogs, fumes, mists, gases, smokes, vapours.	Facemasks with appropriate filters for dust removal and air purification (chemicals, mists, vapours, and gases). Single or multi-gas personal monitors, if available.
	Oxygen deficiency	Portable or supplied air (fixed lines). On-site rescue equipment.
Body/leg protection	Extreme temperatures, hazardous materials, biological agents, cutting, and laceration.	Insulating clothing, bodysuits, aprons etc. of appropriate materials.

Source: General EHS Guidelines: Environmental Noise Management

Maximum permissible noise for specific environment by BOBS

Facility	Noise Limit dBA(Leq)	
	Day ^a	Night ^b
Pre-school bedrooms, inside bedrooms, indoor hospital and ward rooms	30	30
School classrooms and preschools during class(indoors)	35	35
Any building used as hospital, convalescence home, home for the aged, sanatorium, learning institutions, conference rooms, public library, and environmental and outdoor recreational site	45	35
Residential building	50	35
Mixed residential with some commercial and outdoor entertainment	55	45
Residential and industry/small scale production and commerce	60	50
Industrial area, commercial, civic community including churches, shopping and traffic areas (Indoor and outdoor)	70	60
Railway and highways	70 ^c	70 ^c
Ceremonies, festivals and entertainment events	100 ^e	100 ^e
Day is from 6:00am to 8:00pm Night is from 8:00pm to 6:00am Time base is per 24 hours Time base is per 4 hours Limit shall not be exceeding more than five times in a year		

Source: BOS 575:2013:2

Maximum permissible continuous and /or intermittent noise exposure levels

Noise level dBA(Leq)	Duration per day ^a	Duration per week ^b
85	8 :00 hours	40:00 hours
88	4:00 hours	20:00 hours
91	2:00 hours	10:00 hours
94	1:00 hours	5:00 hours
97	30:00 minutes	2:50 hours
100	15:00 minutes	1:25 hours
103	7:50 minutes	37:5 hours
106	3:75 minutes	18:75 hours
109	1:87 minutes	9:37 hours
Day refers to a 24-hour period		
Week refers to 7 days		

Source: BOS 575:2013:3

Maximum permissible noise levels for impact or impulsive noise

Sound level (dBA) Lmx	Permitted number of impulses or impacts per day
140	100
130	1000
120	10000
Day refers to a 24 hour period	

Source: BOS 575:2013:2

Maximum permissible peak noise levels

Facility	Limit value dBC
For any building used as hospital, school, convalescent home, old age home residential building	109
For any building in an area used for residential and one or more of the following purposes: civic and community including churches, commerce, small-scale production, entertainment, or any residential apartment in an area that is used for purpose of industry, commerce or small-scale production	114

Source: Botswana Standard (2013)

Threshold Limits for Common Air Pollutants

Parameter	Pollutant	Limit Value ($\mu\text{g}/\text{m}^3$)	Averaging Period	Permitted Annual Exceedances
Ambient Air	Sulphur dioxide	350	1 hour	24

Parameter	Pollutant	Limit Value ($\mu\text{g}/\text{m}^3$)	Averaging Period	Permitted Annual Exceedances
Quality	(SO ₂)			
(Chemical		125	24 hours	3
Pollutants)	Nitrogen dioxide	200	1 hour	18
	(NO ₂)			
		40	1 year	N/A
	Carbon monoxide	30 000	1 hour	N/A
	(CO)			
		10 000	8 hours ^a	N/A
	Particulate matter	200	monthly	N/A
	(PM ₁₀)			
		100	1 year	N/A
	Ozone (O₃)^b	120	8 hours ^a	25 days averaged over 3 years
	Lead (Pb)	0.5	1 year	N/A
	Benzene (B₆H₆)	5	1 year	N/A

^a The maximum daily 8 hour mean concentration will be selected by examining 8 hourly running averages, calculated from hourly data and updated each hour. Each 8 hour average so calculated will be assigned to the day on which it ends i.e. the first calculation period for any one day will be the period from 17h00 on the previous day to 01h00 on that day; the last calculation period for any one day will be the period from 16h00 to 24h00 on that day.

^b Target value.

Source: BOS, 498:

ANNEX 14: COVID-19 REGULATIONS AND PROTOCOLS

<https://covid19portal.gov.bw/covid-19-regulations>

<https://covid19portal.gov.bw/sites/default/files/2020-05/INFECTION-PREVENTION-CONTROL-MEASURES-IN-WORKPLACES-GUIDE.pdf>

<https://www.euro.who.int/en/health-topics/health-emergencies/coronavirus-covid-19/publications-and-technical-guidance/environment-and-food-safety/covid-19-and-food-safety-guidance-for-food-businesses-interim-guidance,-07-april>

ANNEX 15: ENVIRONMENTAL AND SOCIAL MANAGEMENT PLAN

Environmental and Social Management Plan

Environmental and Social Management Structure

Water Utilities Corporation

This chapter represents the measures and actions required for the project to achieve compliance with the ESMP considering the findings of the environmental and social assessment, World Bank's due diligence and alignment with its policies and principles, the laws and regulations of Botswana, and the results of the engagement with stakeholders, interested parties and project affected people.

Mitigation Plan

The mitigation plan presents a programme for the management of mitigation measures. It answers the questions on what impact is to be mitigated, the mitigation measure to be implemented, and resources required for implementing the measures and assigning responsibility on who undertakes the mitigation measures. This is presented in Table 60.

Environmental and Social Inspection and Reporting

The Contractor shall appoint an environmental officer registered with Botswana Environmental Assessment Practitioner's Board (EAPB) and a qualified Social Expert to oversee the proper implementation of all social and environmental mitigation and enhancement measures recommended in this report. The Contractor's environmental officer will prepare a Contractor's ESMP (C-ESMP) and compile a monthly report detailing environmental and social performance for the period. It will include past performance, audit reports and monitoring data, planned action for mitigating anticipated risks and how recommendations made by WUC's project environmental and social officers are being implemented. The Codes of Conduct, GM, C-ESMP and related safeguards will also be included in the bid documents as requirements for procuring the Contractor.

Roles and Responsibilities

- WUC

The overall responsibility for implementing the ESMP lies with WUC's Project Implementation Unit (PIU). WUC will need to monitor the implementation of the mitigation measures and has appointed environmental and social officers as part of the PIU to assist with this responsibility.

- Environmental Specialist (Project Liaison Officer)

Enviro Solve Consultancy (Pty) Ltd has been appointed as the environmental consultant to be called the Project Liaison Officer (PLO) tasked to monitor the project. He/she will carry out daily site inspections and to verify compliance with ESMP requirements. Feedback to the client would be in the form of monthly progress reports and feedback. Urgent or pressing issues will be brought to the attention of WUC's PIU immediately. The PLO will oversee the implementation of project activities in accordance with the mitigation implementation programme, ensure that the code of conduct is adhered to, sign off to indicate the satisfactory implementation of mitigation measures, and impose the necessary sanctions, if activities are not carried out in accordance with the ESMP. The PLO will ensure that the contractor follows through on the specified mitigation measures and implement them to the proponent's satisfaction in the specified timeframe.

The Key Responsibilities of the PLOs are to:

- Monitor the contractor's implementation of the ESMP/C-ESMP via daily inspections of the contractor's camps and works sites.
- Organize periodic stakeholder's meetings to ascertain the effectiveness of mitigation measures.
- Prepare and submit monthly Environmental and Social Reports summarizing the contractor's activities (such as training programmes, community meetings, etc.) and compliance with the ESMP and C-ESMP to WUC and the DEA in compliance with Section 18 of the EA Act, 2011.
- If the PLOs identify any ESMP/C-ESMP non-compliance issues by the contractor, a non-compliance notice will be issued to the contractor through the Engineer to act. This will be included in the report to the WUC and on urgent issues, will be reported immediately. All documentation and communications to the Contractor will be kept and preserved in accordance with good record keeping practices as this will be essential in the event of disputes and for project completion reviews.

The contractor will be required to prepare a corrective action plan to be implemented by a date agreed with the Engineer. Non-compliance will be ranked according to the following criteria:

Non-Compliance Level I: A situation that is not consistent with requirements of the ESMP/C-ESMP, but not believed to present an immediate or severe social or environmental risk. Repeated Level I concerns may become Level II concerns if left unattended.

Non-Compliance Level II: A situation that has not yet resulted in clearly identified damage or irreversible impact, but which demonstrates potential significance. Level II requires expeditious corrective action and site-specific attention to prevent severe effects. Repeated Level II concerns may become Level III concerns if left unattended.

Non-Compliance Level III: A critical situation that will result in significant social or environmental damage occurring or a reasonable expectation of very severe impending damage. Intentional disregard of Non-Compliance Notices or specific prohibitions is also classified as a Level III concern.

- The Contractor

The Contractor will be responsible for the day-to-day implementation of the project activities. To effectively implement this, the Contractor shall appoint an Environmental Officer (EO), Social Officer and a Community Liaison Officer (CLO). The contractor must ensure that the supervisors including other workers of the project are well informed of the contents of the ESMP so that these are cascaded to the rest of the workforce on the sub-project. The contractor will report any difficulties in implementing the mitigation measures to the PLO and ensure that all instructions which are given by the client in pursuance of the same are carried out:

The contractor is expected to prepare and submit to the WUC, a C-ESMP which includes COVID-19 mitigation measures and management strategies.

The document would provide a detailed explanation of how the contractor will comply with the project's ESMP and demonstrate that sufficient funds are budgeted for that purpose.

The C-ESMP should include COVID-19 mitigation measures and management strategies and other specific mitigation and enhancement measures based on the ESMP, the final design and the site selected for the contractor's camp. The plan should have Management Strategy and Implementation Plans (MSIPs) for the following and guidelines for details required are presented in Annexes 4, 5, 6, 7, 8, 9, 10, 12, 13 and 15:

- Work Activities Plan
- Traffic Management Plan (TMP)
- Occupational Health and Safety Strategy (the strategy to include COVID-19 protocols)
- Community Health and Safety Management Strategy (the strategy to include COVID-19 protocols)
- Waste Management Plan at the Contractor’s camp
- Labour Influx Management Plan
- Labour Management Plan
- Vibration (Blasting) Plan
- Codes of Conduct to address GBV/VAC including training and awareness on community relations and norms for its workers as well as codes of conduct for handling of grievances, reporting and handling of GBV/VAC cases.
- The Contractor is to prepare and submit a monthly report on the implementation/compliance on the environment and social mitigation measures, including compliance with the codes of conduct.

- The World Bank

The World Bank provides support to ensure compliance with the provisions of the ESMP and World Bank safeguards policies together with WBG EHS Guidelines and will assist with technical capacity building.

- Other Supporting National and Local Institutions

In addition to WUC, the PLOs, and the Contractor, further checks and balances will be provided by relevant institutions. These are shown in **Table 71** below. These institutions will have an oversight role to ensure environmental and social safeguards are complied with in the implementation of the ESMP as listed in the Monitoring Plan. They are to be formally introduced to the sub-project by WUC before and during implementation. They will be invited to attend monthly site progress meetings and shall be trained to increase their capacity for oversight monitoring.

Table 71: Supporting National and Local Institutions in ESMP Implementation

Institution	Mandated Role	Role/Activities to Play in ESMP Implementation
Ministry of Land Management, Water and Sanitation Services	Policy and funding for land, water and sanitation	Funding and policy direction
Tutume and Nata Sub-Land Boards	Management of Tribal Land	Permit/ give surface rights for contractor’s camps, Labourer’s Camp, reservoir tank and pump stations. If any resettlement issues arise assist in evaluating land parcels.
Ministry of Nationality, Immigration and Gender Affairs	Policy and responsible for Gender Affairs, and Immigration issues	Creation of a gender sensitive environment Promotion of gender equality Coordination and facilitating capacity building in various aspects of gender and development. Promotion of the development of gender sensitive sectoral policies and procedures.

Institution	Mandated Role	Role/Activities to Play in ESMP Implementation
Department of Environmental Affairs	Responsible for Environmental and Social Impact Assessment Preparation and protection of the environment	Will receive monthly reports and audit the project.
Sowa Town and Tutume Sub-District Councils	Seeks development of the district	Provides oversight monitoring of environmental, social safeguards measures and overall project delivery. Through S&CD will monitor that beneficiaries including the vulnerable people are employed.
Department of Occupational Health and Safety	Ensures the safety and welfare of workers at the factories	Inspect sites for safety of workers and compliance with the Factories Act.
Department of Waste Management and Pollution Control	Policy making and in charge of waste management in the country	Inspect sites for waste management (land pollution, soil contamination etc.).
Department of National Museum and Monuments	Responsible for archaeology in the country (Cultural and historically sites and artefacts)	Will respond to Chance Finds and give guidance.
Botswana Police Services	Protection and prevention of Crime and Civil cases.	Maintain peace at the work sites and provide advice on crime prevention and affrays; will address crime.
Department of Labour and Home Affairs	Labour issues	Provide safety awareness/education materials for workers. Inspect sites periodically
Department of Road Transport and Safety	Promotes road and machinery use in a safely manner	Ensure that the machinery to be used by the contractor is safe to use.
Department of Radiation Protection and Inspectorate	Permits use of radiation equipment and monitors the exposure	Permit use of laboratory equipment at the waterworks site.
District Medical Health Teams (Medical Facilities)	Provide health education and medical services	Provide health awareness/ education materials and provide medical services to ill/sick workers.
Village Development Committees and Tribal Administration	Settlement development and local/ community governance	Choose representatives for GM. Monitor implementation of Safeguard measures.
Department of Gender Affairs	The Department's responsibilities include the promotion of gender equity and the coordination and	Educate and create awareness on social issues such as GBV and revitalization of aspects of San women and their rights. Be part of the GM Committee.

Institution	Mandated Role	Role/Activities to Play in ESMP Implementation
	facilitation in various aspects of gender policy development.	

Table 72: Mitigation Plan

Project Activity	Phase	Potential Impacts	Proposed Mitigation Measures	Institutional Responsibility	Estimated Costs (Pula BWP)
WASTE MANAGEMENT					
All construction activities (Pipe laying, storage and pump stations construction)	Pre-Construction, Construction, Decommissioning and Operation	Improper waste handling and disposal	<p>A centralised waste storage area needs to be set up as a temporary facility. It needs to have restricted access (e.g., fencing and locked gate) and have adequate lighting.</p> <p>Only the designated dumping site per village sub-project should be used for solid waste disposal. These centralised areas should be access restricted, demarcated and organised in such a way that waste types can be sorted, and the different types stored safely (on a temporary basis) before transport and disposal. Wastewater from all toilets will be collected by a reputable and certified waste handler (certified by the DWMPC) and transported to a certified Wastewater treatment facility in Sowa Town.</p> <p>Bunded walls with appropriate cover and ventilation should be constructed at the contractor’s camp, labourer’s camp and construction sites for temporary containment of liquid wastes before disposal.</p> <p>Liquid waste (used oils, diesel and other hydrocarbons) from the contractor’s camp, Labourer’s camp and construction sites should be collected by a reputable waste handler who is licensed by the DWMPC, and it should be transported to a certified handling facility.</p> <p>A record (including waste manifests, waste quantities) of all waste collection, disposal</p>	SHE Officer Environmental Officer Social Officer Resident engineer	250, 000.00

Project Activity	Phase	Potential Impacts	Proposed Mitigation Measures	Institutional Responsibility	Estimated Costs (Pula BWP)
			<p>methods and final destination of waste should be kept on site.</p> <p>Trucks hauling waste must be covered and adhere to the Contractor's Traffic Management Plan.</p> <p>Waste receptacles with animal proof lids must be provided at all the working sites, Labourer's camp and the contractor camp site.</p> <p>Waste recycling objectives should be established, workers should be provided with training to meet the objectives and waste receptacles should be colour coded and properly labelled to encourage waste recycling.</p> <p>Provide portable toilets onsite for both males and females during construction phase.</p>		
SOCIAL MANAGEMENT					
Trenching for pipe laying	Construction	Disruption of public routes or access	<p>Restore, to the extent possible, any public infrastructure or amenities that are disrupted to enable continued access.</p> <p>Pedestrian crossing points must be constructed at 2 km intervals along trenches.</p> <p>Provide temporary crossing over the excavated trenches to facilitate ease of access. Red danger tape should be placed along the trenches, and it should be visible to residents and motorists.</p> <p>All open trenches should be backfilled as soon as possible to avoid injuries to people, livestock and wildlife in the project area.</p> <p>All open trenches should be marked off with danger warning tapes.</p> <p>Excavated areas should be cordoned off with reflective danger warning signage and trenches should be covered within 12 hours.</p>	Contractor SHE Officer Environmental Officer Social Officer	250, 000.00

Project Activity	Phase	Potential Impacts	Proposed Mitigation Measures	Institutional Responsibility	Estimated Costs (Pula BWP)
			Provide an avenue for complaints by the public (i.e., GM) and make the public aware of this mechanism.		
Recruitment and job seeking	Construction, Operation and Decommissioning	Provision of unskilled, semi-skilled and skilled employment	Contractor should notify community of job opportunities prior to start up and sensitise them regarding the types and number of labourers needed and skills required. Implement a recruitment process to adhere to labour procedures and policies. (Employment Act CAP 47:01 Item (1). The Act advocates for equal opportunities for qualifying applicants, irrespective of gender, tribe, religion, or political beliefs.) Advertise employment opportunities via village kgotlas. Development of a recruitment strategy that takes into consideration locally available skills. Implement labour intensive rather than capital intensive work methods wherever possible. Educate and train employees to enable skills transfer.	Contractor Project Manager Environmental Officer Social Officer	100,000.00
Procurement of Goods and services Influx of people working for the contractor Hawkers selling goods and cooking for contractors	Construction	Enhanced socio-economic development (livelihoods improvement)	Uphold measures geared towards citizen empowerment and skills transfer. Embark on projects social responsibility to uplift livelihoods. Optimise and upgrade water transmission infrastructure for reticulation efficiency. Encourage the procurement of goods and services from local service providers, disadvantaged individuals and women.	Contractor Environmental Officer Social Officer	160,000.00
Recruitment (Influx of people)	Construction	Erosion of societal norms & values and Gender Based Violence (GBV)	Raise awareness amongst the local communities on social ills and their implications.	Contractor - Project Manager Environmental Officer	100,000.00

Project Activity	Phase	Potential Impacts	Proposed Mitigation Measures	Institutional Responsibility	Estimated Costs (Pula BWP)
			<p>Maximise the hiring of local labour by the contractor.</p> <p>Sensitise the construction workers on community values and norms.</p> <p>Participate in local crime prevention activities.</p> <p>Liaise closely with the police and other crime law enforcement authorities to address crime and social problems.</p>	Social Officer	
HEALTH AND SAFETY					
All Construction activities	Pre-Construction, Construction, Decommissioning and Operation	Potential accidents and injuries (Occupational Health)	<p>Workers should have a standard overall, safety boots and hard hats to be allowed access to the construction site. It should be the mandated standard PPE for every worker and its use should be monitored.</p> <p>Implement a confined space entry program that is consistent with applicable national requirements.</p> <p>Use fall protection equipment when working at heights.</p> <p>Maintain work areas to minimise slipping and tripping hazards.</p> <p>Use proper techniques for trenching shoring.</p> <p>Implement fire prevention measures in accordance with internationally accepted standards.</p> <p>Prudent handling and storage of hazardous chemicals shall be enforced.</p> <p>Various PPE should be provided for different hazardous work environment such as dust masks, gloves, safety goggles, ear plugs, safety harness etc.</p> <p>Workers should be properly trained on safety measures on site.</p>	Contractor SHE Officer Environmental Officer	500, 000.00

Project Activity	Phase	Potential Impacts	Proposed Mitigation Measures	Institutional Responsibility	Estimated Costs (Pula BWP)
			<p>A worker proficient and certified in first aid should always be available on site.</p> <p>A fully equipped first aid kit should be available in all the construction vehicles and at the site office, as well as the Labourer's camps.</p> <p>Workers should be provided with protective clothing such as boots and gloves.</p>		
Excavations for trenching	Construction	Potential trench collapse (cave-ins)	<p>Employ a competent person to inspect trenching daily.</p> <p>Train workers on working safely in/ around trenches and early detection of potential trench collapse.</p> <p>Keep heavy equipment/ activities away from trench edges.</p> <p>Identify locations of underground utilities.</p> <p>Provide safe access and ingress to all excavations. This should be ladders and steps ramps at 2 km intervals and where necessary within the villages to access.</p> <p>Stockpiles of excavated materials should be put at minimum safe distance of 1 m from the edge of the trench.</p> <p>Protect workers and trenches by use of proper techniques for shoring or shielding.</p> <p>Prevent community members (especially children) and animals from entering the construction area with open trenches.</p> <p>Minimise the length of open trenches at any one period and backfill trenches as soon as possible.</p>	Contractor SHE Officer Environmental Officer	100, 000.00
Haulage of construction materials and equipment	Pre-Construction, Construction and Decommissioning	Increased traffic and road traffic related accidents	Traffic routes should avoid villages and other habited places as far as possible.	Contractor SHE Officer	85, 000.00

Project Activity	Phase	Potential Impacts	Proposed Mitigation Measures	Institutional Responsibility	Estimated Costs (Pula BWP)
			<p>Routes should be demarcated, and all construction traffic made to use the designated routes, including visitors to the sites.</p> <p>Speed limits should be appropriately designated especially within villages and high-risk areas (80 km/hr within the highways, 60 km/hr on dirt roads, 30 km/hr around the work sites and 40 km/hr within the village).</p> <p>Construction vehicles need to be fitted with hazard lights, checked for road worthiness, fitted with reverse sirens.</p> <p>Flagmen should be employed to direct and manage traffic in congested/dangerous traffic situations.</p> <p>Truck drivers should have the necessary certificates/licenses to drive the trucks.</p> <p>Behaviour of Contractor road users should be monitored and offences penalised.</p> <p>Deliveries to be made during low traffic peak hours and traffic routes should avoid villages and other habited places as far as possible.</p> <p>Strategic routes should be demarcated and construction traffic should use the designated routes including visitors to the sites.</p> <p>Traffic warning signs must be placed strategically at road turn offs to warn oncoming traffic.</p> <p>Truck drivers should be briefed on road traffic rules and regulations.</p> <p>Trucks transporting large equipment or hazardous waste to be clearly marked.</p> <p>Night driving should not be permitted.</p>		

Project Activity	Phase	Potential Impacts	Proposed Mitigation Measures	Institutional Responsibility	Estimated Costs (Pula BWP)
Loading, Haulage and dumping	Pre-Construction, Construction, Operation and Decommissioning	Noise pollution	<p>Employees must be provided with full PPE including ear plugs and masks.</p> <p>PPE should be reserved for the visitors</p> <p>Visitors should be given induction training before they are allowed entry into the sites.</p> <p>Conduct toolbox talks for workers to raise awareness about the impacts of noise and how to minimise it.</p> <p>Select equipment with lower sound power levels.</p> <p>Install acoustic barriers in order to minimise the transmission of sound through the barrier.</p> <p>Limit construction vehicle movement (especially trucks) to and from site to normal working hours only i.e. 6am to 6pm.</p> <p>Maintenance of silencers on diesel powered equipment where necessary.</p> <p>Systematic maintenance of all forms of equipment.</p>	Contractor SHE Officer	150, 000.00
Loading, Haulage and dumping Vegetation clearance	Pre-Construction, Construction, Operation and Decommissioning	Dust nuisance and health risks	<p>Spray work areas, short access roads around pump stations and storage tanks with grey water to suppress dust.</p> <p>Provide protective dust masks to workers and ensure that they are worn during all activities that generate dust.</p> <p>Enforce speed limits on site in order to minimize dust pollution.</p> <p>Visually monitor dust generation from work zones and implement dust suppression measures.</p> <p>Minimise dust from open area sources, including storage piles, by using control measures such as installing enclosures and covers and increasing moisture content</p>	Contractor SHE Officer Environmental Officer	150, 000.00

Project Activity	Phase	Potential Impacts	Proposed Mitigation Measures	Institutional Responsibility	Estimated Costs (Pula BWP)
All project activities (Social interactions)	Pre-Construction, Construction, Operation and Decommissioning	Possible increase in STIs and HIV/AIDS infections	Setting up of HIV and AIDS structures in the communities (project areas) to intensify HIV/AIDS awareness campaigns in the district Provision of STI screening and treatment on-site for early diagnosis. Ensure availability and access to condoms in the workplace. Provision of behavioural change awareness materials on-site and in the nearby communities. Code of Conduct on HIV/AIDS project specific.	Contractor SHE Officer Environmental Officer	200, 000.00
All project activities (Social interactions)	Pre-Construction, Construction, Operation and Decommissioning	An increase in COVID-19 and other viral disease prevalence rates	Provide wash basins with soap at all the sub-project sites to prevent the spread of COVID-19 within the communities. Design the contractor and labourer's camp to avoid the spread of the disease. Conduct awareness sessions in the communities and for sub-project workers on the disease and its risks, as well as the major drivers of COVID-19 spread such as poor sanitation, physical contact and airborne transfer by formally engaging the Ministries of Health and Wellness, Nationality, Immigration and Gender Affairs to harness existing and integrate existing COVID-19 programmes into the sub-project. Develop materials that seeks to promote awareness, good hygiene behaviour and social distancing. Engage the village clinics to provide monthly onsite health talks to provide and promote access to COVID-19 testing services. Ensure contractor enforces Codes of Conduct for COVID-19 and conducts awareness training	All those involved in construction (Contractors, Sub-Contractors, Engineers and Environmentalist) Community health facilities	500, 000.00

Project Activity	Phase	Potential Impacts	Proposed Mitigation Measures	Institutional Responsibility	Estimated Costs (Pula BWP)
			<p>on them to ensure all workers are aware of expected behaviours.</p> <p>Ensure the community is aware of the GM.</p>		
All project activities (Social interactions)	Pre-Construction, Construction and Decommissioning	Potential increase in Sexual Exploitation and Abuse (SEA), Sexual Harassment (SH) and Violence Against Children (VAC)	<p>Raise awareness to sensitise the construction crew who are not from the region to respect community values and norms.</p> <p>Comply with monitoring and reporting requirements as per the Codes of Conduct, including age restrictions on any sexual activity (under 18 years of age) and behaviours that constitute GBV, SEA, SH and VAC.</p> <p>Conduct awareness raising sessions among workers and the community about social ills that are likely to emerge due to interaction of locals with migrant workers.</p> <p>Liaise closely with the police and other crime law enforcement authorities, NGOs to address GBV, SEA, SH and VAC and other social problems that may be exacerbated by the project.</p> <p>Engage a GBV service provider to conduct an awareness talk periodically (monthly) on GBV, and their prevention and to provide services to GBV survivors.</p> <p>Train project-related staff and residents of the communities in behaviour obligations. To make this effective, all workers will be required to sign an Individual Code of Conduct as presented in Annex 8 Provide training and awareness sessions about the Codes of Conduct to enhance understanding among sub-project workers.</p> <p>Ensure women have equal opportunity to be hired as this could help address the problem of</p>	All those involved in construction (Contractors, Sub-Contractors, Engineers and Environmentalist) Department of Gender Affairs Botswana Police Services	P 100, 000.00

Project Activity	Phase	Potential Impacts	Proposed Mitigation Measures	Institutional Responsibility	Estimated Costs (Pula BWP)
			<p>younger women getting into relationships for financial support and being abused in that process.</p> <p>Form a GBV, SEA, SH and VAC team as per World Bank's guidelines as presented in Section 11.</p> <p>Engage police in sensitization and awareness on GBV, SEA, SH and VAC to ensure they are aware of procedures in place and need for survivor-centred procedures and to participate in community and worker training.</p>		
WATER RESOURCES MANAGEMENT					
Setting up contractor's camp, construction of all project components and decommissioning of project components	Pre-Construction, Construction and Decommissioning	Groundwater contamination	<p>Service construction vehicles and machinery regularly and properly to reduce breakdowns and seal any leakages.</p> <p>Servicing should be done on protected area where spillages can be contained (bundled area that is seepage free).</p> <p>Provide leak-proof receptacles or drums for storing used oil and they should be kept in a protected area.</p> <p>Portable spill containment and clean-up equipment should be provided at the project site.</p> <p>In the event of a spill, the Contractor shall take prompt action to clear the polluted area and prevent the spread of pollutants.</p>	Contractor Project Manager Resident Engineer Environmental Officer	100, 000.00
LAND USE					
Excavations and laying of pipes	Construction	Encroachment of pipe infrastructure into people's residence/properties due to inadequate servitudes	<p>Establish a good working relationship to allow access for maintenance purposes (where pipeline is too close to private property).</p> <p>Physical inspection of plots against layout plans, and where there are discrepancies,</p>	Contractor Project Manager Resident Engineer Environmental Officer	100, 000.00

Project Activity	Phase	Potential Impacts	Proposed Mitigation Measures	Institutional Responsibility	Estimated Costs (Pula BWP)
			undertake surveying of the plots and produce updated layout plan. In case of relocations, compensation of affected plot owners should comply with Compensation Guidelines for Tribal Areas 2010 and the prepared Resettlement Policy Framework.		
SOIL MANAGEMENT					
All construction activities (Pipe laying, storage tanks and pump stations construction)	Pre-Construction, Construction and Decommissioning	Soil erosion	In areas where the soils are powdery and cannot be effectively compacted, a 5 cm layer of gravel must be applied over the top of compacted trench material. Erosion control measures should be implemented such as wetting down the site to control dust, covering/screening of stockpiles, positioning stockpiles in areas that are not prone to winds. A silt curtain should be erected at the outlets at the reservoir sites, to screen runoff water. Minimise erosion during flushing by avoiding discharge areas that are susceptible to erosion and spread the flow to reduce flow velocities	Contractor SHE Officer Environmental Officer	150,000.00
ECOLOGICAL MANAGEMENT					
Clearing for the pipeline, storage tanks, pump stations and camp sites	Pre-Construction, Construction and Decommissioning	Loss of vegetation (clearing of rights-of-way for pipeline and infrastructure construction)	In the bid to reduce amount of vegetation clearing, and hence project's ecological footprint, consider aligning the pipeline route with existing vegetation-cleared routes, where technically feasible. For example, along existing roads, cut lines, firebreaks, water pipelines and disease control fence lines. Perform a comprehensive systematic inventory of cleared vegetation with particular emphasis on plants of notable conservation significance,	Contractor Design Engineers Environmental Officer	45, 000.00

Project Activity	Phase	Potential Impacts	Proposed Mitigation Measures	Institutional Responsibility	Estimated Costs (Pula BWP)
			i.e. rare species and IUCN Redlist classified species, if there are any within the sites. Where practical, adjust the water pipeline to avoid large adult protected plant species, e.g. adult mowana (<i>Adansonia digitata</i>) tree		
All construction and decommissioning activities	Pre-Construction, Construction and Decommissioning	Increased risk of illegal procurement of biodiversity	Conduct training workshops for construction staff on the dangers and possible consequences of illegal use of biodiversity, i.e. effect on biological species conservation, penalties and fines. Increase monitoring and surveillance for poaching (e.g. regular visits by DWNP and other security agencies). Consider embedding DWNP/security personnel into construction camps as a preventative strategy. Report all incidents of poaching to the DWNP, DFRR or Botswana Police Service. Develop and implement a poaching surveillance and monitoring system.	Contractor Environmental Officer DWMP and DFRR Botswana Police Services Resource Persons (trainer)	75, 000.00
All construction and decommissioning activities	Pre-Construction, Construction and Decommissioning	Elevated risk of increased incidents of negative human-wildlife interaction (HAC)	Proper management (on-site processing, recycling, wildlife proof waste receptacles, appropriate disposal at designated sites). Conduct staff training workshops/seminars on HAC (background, presentation, consequences and response procedures). Routine maintenance and repair of leakages as soon as they occur. Display warnings signs e.g. "Wild animals are dangerous - do not feed or approach too close". Develop and implement HAC and wildlife habituation monitoring system.	Contractor Environmental Officer Department of Waste Management & Pollution Control Sowa Town Council & Tutume Sub-District Council Private Waste Management Companies	150, 000.00

Project Activity	Phase	Potential Impacts	Proposed Mitigation Measures	Institutional Responsibility	Estimated Costs (Pula BWP)
			Report all incident of HAC to the nearest Department of Wildlife and National Parks office or Police Station.		
All construction activities and water leakages along the project infrastructure	Construction and Operation	Wildlife habituation and modification of behavior	Development of a comprehensive water leaks' monitoring and detection system for early warning. Effective maintenance and repair water infrastructure (leaks). Monitor spatio-temporal distribution of wildlife populations along the water infrastructure. Monitor patterns and trends of wildlife mortality due to vehicle collision along the pipeline route.	Contractor Environmental Officer DWNP Local Conservation NGOs Private Researchers and Specialists Consultants	50, 000.00
Excavations of trenches for pipelines	Construction and decommissioning	Increased risk of wildlife mortality due to pitfalls	Keep to the minimum possible the length of trench left open over night. No open trenches should be left over night near hydrological features (<250 m); rivers and pans, including pre-existing pipe leakages. Mark all open trenches with luminous red-white tape to make open trenches more visible to approaching wildlife. Report all incidents of wildlife pitfalls to the nearest DWNP Office or Botswana Police.	Contractor Environmental Officer Department of Waste Management & Pollution Control Botswana Police Service	100, 000.00
All construction and decommissioning activities	Pre-Construction, Construction and Decommissioning	Increased incidents of veldt fires	Implement fire suppression measures which include automatic and fire protection equipment such as automatic sprinkler systems, manual portable extinguishers and fire hose reels. Conduct staff training workshops on basic fire management and response procedures, and fire suppression. Develop internal fire reporting, response procedures and fire response plan which includes neighbours.	Contractor Environmental Officer DFRR, DWNP, BPS Resource Persons (trainer)	85, 000.00

Project Activity	Phase	Potential Impacts	Proposed Mitigation Measures	Institutional Responsibility	Estimated Costs (Pula BWP)
			Report all incidents of fires to the nearest Department of Forestry and Range Resources office or any Botswana Police Service station. Monitor fires occurring along the water infrastructure route; frequency, intensity, direction and possible expansion.		
All construction activities	Pre-Construction, Construction and Decommissioning	Pollution of the natural environment	Develop waste management systems for disposal of the various waste material generated from construction and decommissioning phases. Sort and where possible manage waste onsite (e.g. drying and burning or burying of organic and waste food). Reuse and/or recycle waste material as much as possible, e.g., some of the waste pipes can be sold to local farmers. Dispose of all waste material at nearest designated sites, i.e. landfills, sewage ponds. Where applicable, pay of local council levies and rates or engage private waste management companies to collect dispose waste materials. Develop and implement a waste monitoring system (quantity, frequency of disposal and others).	Contractor Environmental Officer DWMPC Sowa Town Council and Tutume Sub-District Council Private Waste Management Companies	150, 000.00
ARCHAEOLOGICAL AND CULTURAL MANAGEMENT					
Clearing for the pipeline, storage tanks, pump stations and camp sites	Pre-Construction, Construction and Decommissioning	Uninformed destruction of archaeological materials	Make sure an archaeologist is on site after clearing the vegetation and during construction to guard against uninformed destruction of archaeological materials Salvage chance discoveries	An archaeologist of approved credentials by the National Museum	50, 000.00
OPERATION AND MAINTENANCE PHASE					
Operation of the water scheme	Operation	Improved livelihoods due to water availability	Systematic maintenance of the public stand pipes and the related infrastructure.	WUC Management	Part of operation cost budget by WUC

Project Activity	Phase	Potential Impacts	Proposed Mitigation Measures	Institutional Responsibility	Estimated Costs (Pula BWP)
			<p>Mobilising of community members to reticulate water to their plots to reduce pressure on the use of the public stand pipes.</p> <p>Public awareness on wise water usage and taking care of the water infrastructure</p> <p>Sensitising school children on water management.</p> <p>Community leadership and S&CD Office requesting WUC to come with a programme that allows people to pay for water connection in instalments and the connection only done once they have paid off the fee.</p> <p>Finding out if it is possible to install the prepaid water taps to the households to avoid people not being able to pay bills and their water supplies being disconnected, and then being faced with the payment for reconnection and the outstanding bills.</p>		
Operation of the water scheme (Water extraction)	Operation	Groundwater over-mining (Depletion)	<p>Avoid groundwater resources pollution from the surrounding area.</p> <p>Finding long term alternative water sources for sub-project villages that can be used to help replenish aquifers. Deriving water from other sources would also give aquifers time to refill instead of pumping too much water from them at once.</p> <p>Monitoring groundwater usage by WUC in the area and activities that can contribute to the water resource pollution.</p> <p>Pumping rates and frequency of project boreholes to be well optimised by WUC to avoid over pumping.</p>	WUC Management	Part of operation cost budget by WUC

Project Activity	Phase	Potential Impacts	Proposed Mitigation Measures	Institutional Responsibility	Estimated Costs (Pula BWP)
Operation of the water scheme	Operation	Water supply disruptions due to vandalism/theft of infrastructure	<p>Raise community awareness on pipe vandalism and its consequences such as water shortage and the associated reduction in water pressure. This should be done by WUC through the village leadership.</p> <p>Provision of lockable manhole covers and locks for all the manholes including valve chambers.</p> <p>Monitor telemetry and SCADA to identify pipe leaks and urgently respond to the leakages to minimise the subsequent pipe vandalism by wildlife especially elephants.</p> <p>Provide an electric perimeter fence and provide metal spikes embedded on a perimeter concrete apron to deter elephants.</p>	WUC Management	Part of operation cost budget by WUC
ESTIMATED TOTAL COSTS IN BWP					P3, 700, 000.00

Monitoring Plan

Monitoring is the activity undertaken to provide specific information on the characteristics and functioning of environmental and social variables in space and time. This involves monitoring the achievement of targets or the performance of certain management actions concerned with the project. The impacts to be monitored in Table 61 were selected because they are highly significant impacts, and they will need regular monitoring to ensure that they adhere to the stipulated threshold.

Monitoring Indicators

Monitoring indicators are used to monitor environmental changes, assess the efficacy of mitigation measures, and provide warning signals for impending environmental shifts. The following are important:

- Parameter to be monitored
- Source/Location of monitoring
- Key performance indicator
- Methods of monitoring
- Responsible agent for monitoring
- Frequency of monitoring

Table 73: Monitoring Table

Potential Environmental Impacts	Parameters to be Monitored	Location	Key Performance Indicator	Method of Monitoring	Responsible Agent for Monitoring	Frequency of Measurement	Reporting Mechanism	Threshold or Existing Standard	Recommended Action when Threshold is Exceeded
WASTE MANAGEMENT									
Improper waste handling and disposal	Waste Management Section 34 of the Waste Management Act makes it an offence to indiscriminately dump litter at a place not so gazette Waste Management Procedure Section 5 Item 5.1; Waste segregation Colored bags Specific containers	Construction sites, offices and camp sites	Waste Collection Manifest	Record of frequency of collection and disposal at dumping sites	Enviro Solve Site Agent Tribal Administration Sowa Town Council and Tutume Sub-District Council Department of Waste Management and Pollution Control	Weekly	ESMP monthly monitoring report Site Agent's Report	Waste Management Act, Public Health Act	Work should be halted until proper clean-up is done
SOCIAL MANAGEMENT									
Disruption of public routes or access	Access disruption to public routes	Project villages	Length and duration of open trenches (trenches should be 2 km and	Visual inspection and use of measuring wheel to	Enviro Solve Site Agent Sowa Town Council & Tutume Sub-District Council	Daily	ESMP monthly monitoring report Site Agent report	No blockage for more than 12 hours	The contractor should provide temporary access or backfill to unblock access

Potential Environmental Impacts	Parameters to be Monitored	Location	Key Performance Indicator	Method of Monitoring	Responsible Agent for Monitoring	Frequency of Measurement	Reporting Mechanism	Threshold or Existing Standard	Recommended Action when Threshold is Exceeded
			closed within 12 hours) Provision of temporary crossings Presence of danger warning tapes	measure the length Visual inspection of temporary crossings and danger warning tapes					
Provision of unskilled, semi-skilled and skilled employment	Number of workers from the project villages Employment Act CAP 47:01 Item (1) – The Act advocates for equal opportunities for qualifying applicants, irrespective of gender, tribe, religion, or political beliefs	Construction sites and camp sites/offices	At least 60% of unskilled workers are from project villages and should include the vulnerable community members At least 25% of vulnerable community hired At least 25% women are hired	Records of people employed	Enviro Solve PIU Tribal Administration Sowa Town Council and Tutume Sub-District Council	Monthly	Environmental Officer through Monthly monitoring reports and submission to DEA	At least 60% of all workers are from the project villages At least 25% of vulnerable community hired At least 25% women are hired	The Construction work should be stopped until people from the project villages are hired
Enhanced socio-economic development (livelihoods improvement)	Purchasing power and sales of goods and services Employment Act CAP 47:01 Item (1) – The Act advocates for equal	Entire project area	Number of people employed by the project	Review of employment records	Enviro Solve PIU	Monthly	Environmental Officer through Monthly monitoring reports and submission to project committee	Employment Act	Assess requirement and comply with the ESMP

Potential Environmental Impacts	Parameters to be Monitored	Location	Key Performance Indicator	Method of Monitoring	Responsible Agent for Monitoring	Frequency of Measurement	Reporting Mechanism	Threshold or Existing Standard	Recommended Action when Threshold is Exceeded
	opportunities for qualifying applicants, irrespective of gender, tribe, religion, or political beliefs								
Erosion of societal norms and values and Gender Based Violence (GBV)	GBV incidents	Entire project area	Number of GBV cases recorded	Observation Document review/list of GBV cases-GM monitoring log Sport checks with workers/community to ask them their views about how the project is affecting their norms and values	Enviro Solve PIU and CLO SHE Officer Social Worker Botswana Police Services	Daily	Environment alist; Monthly monitoring reports to the project committee PIU monthly reports Community liaison monthly report	Requirement of ESMP, EA Act 2010 Requirement of GM	Assess requirement and comply with the ESMP GM must be properly used and all GBV cases recorded and properly resolved
HEALTH AND SAFETY MANAGEMENT									
Potential accidents and injuries	Accidents and incidents	Entire project area	Number of accidents and incidents	Observation Review of accident and incident reports	Enviro Solve SHE Officer	Daily	ESMP monthly monitoring report Site Agent Report	Factories Act Public Health Act Mines Quarries and Machinery Act	The contractor should engage Occupational, Health, Safety and Environment specialists to

Potential Environmental Impacts	Parameters to be Monitored	Location	Key Performance Indicator	Method of Monitoring	Responsible Agent for Monitoring	Frequency of Measurement	Reporting Mechanism	Threshold or Existing Standard	Recommended Action when Threshold is Exceeded
									conduct awareness on work related accidents
Potential trench collapse (cave-ins)	Unprotected/unstable open trenches	Throughout the construction site where there is trenching	Number of cave-ins/collapse of trenches Percentage of protected trenches against total excavations dug Distance of placement of stockpiles and heavy equipment from trenches	Measurement (Tape measures and measuring wheel) Observations	Enviro Solve Site Agent	Daily	ESMP monthly monitoring report Site Agent report	All dug trenches	The contractor should be ordered to protect the trench walls or backfill it
Increased traffic and road traffic related accidents	Road Traffic Related accidents	Entire project area	Number of road traffic education given to drivers and workers Number and types of road signs erected Number of road traffic offences committed	Review of police records Review of site minutes for road traffic education talks	Enviro Solve Site Agent Traffic Police, Sowa Town Council and Tutume Sub-District Council	Monthly	ESMP monitoring report Site Agent report	Road Traffic Act and Regulations Road Traffic Act (69:01) Section 44 (4a), stipulates that a lower speed limit shall be imposed on a road as considered necessary in the circumstances	Contractor should be ordered to implement road traffic education Action should be taken against regular offenders which should include expulsion from site

Potential Environmental Impacts	Parameters to be Monitored	Location	Key Performance Indicator	Method of Monitoring	Responsible Agent for Monitoring	Frequency of Measurement	Reporting Mechanism	Threshold or Existing Standard	Recommended Action when Threshold is Exceeded
								where road repairs and reconstruction of a road for public safety and to prevent damage escalation on the road.	
Noise pollution	Noise	Entire project area	Noise levels Number of complaints/grievance on noise received	Observation List of complaints (document review) Measurement by use of Sound Level Metre	Enviro Solve Site Agent Tribal Administration Sowa Town Council and Tutume Sub-District Council Department of Waste Management and Pollution Control	Opportunistically when there is an above average noise generating activity	Environmental Officer; Monthly monitoring reports to the project committee and DEA	Allowable noise level occupational exposure limit (OEL) 85dB during the day BOS 575: 2013 Maximum permissible noise levels for continuous and/or intermittent noise dBA(Leq) 85dB for 8hrs/day	Work should be halted until source of noise is identified and corrected
Dust nuisance and health risks	Dust	All active construction sites	Dust emissions of PM10	Observations List of complaints Measurement by use of handheld air sampler	Enviro Solve Site Agent Department of Waste Management and Pollution	Opportunistically when there is a dust generating activity	ESMP Monthly Monitoring Report Site Agent's Report	Atmospheric Pollution Act Dust levels PM10 ≤ 200 µg/m ² (DWMPC Guidelines)	Work should be halted until dust suppression measures are implemented

Potential Environmental Impacts	Parameters to be Monitored	Location	Key Performance Indicator	Method of Monitoring	Responsible Agent for Monitoring	Frequency of Measurement	Reporting Mechanism	Threshold or Existing Standard	Recommended Action when Threshold is Exceeded
					Control (DWMPC)			Aerosols 200 $\mu\text{g}/\text{m}^3$ / and greenhouses gases 100 $\mu\text{g}/\text{m}^3$	
Possible increase in STIs and HIV/AIDS infections	HIV and AIDS	Entire project area	Number and type of HIV awareness information in place Record of HIV awareness meetings and training undertaken per month Record of HIV counselling and testing held	Number of new infections (Document review)	Tutume Sub-District Health Management Team Enviro Solve Site Agent	Monthly	ESMP monitoring report Site Agent report Tutume Sub-District Health Management report	Public Health Act HIV/AIDS Policy Botswana National HIV/AIDS Strategic Framework (1998) Encourage the proponent to educate their workers on the matters relating to HIV/AIDS during project construction	The contractor should be instructed to implement the HIV/AIDS/STIs awareness programmes within the time frame set by the PLO
An increase in COVID-19 and other viral disease prevalence rates	Incidences of COVID-19	Entire project area	Number of people infected Use of masks for COVID-19 COVID-19 Register availability and infrared thermometers	Temperature record COVID-19 Registration register	District Health Management Team District COVID-19 Team Enviro Solve SHE Officer PLO	Weekly	All stakeholders led by District Health Officials; Weekly COVID-19 Report	Public Health Act COVID-19 Regulations and Protocols	Enforce COVID-19 Regulations and Protocols Provide COVID-19 trainings

Potential Environmental Impacts	Parameters to be Monitored	Location	Key Performance Indicator	Method of Monitoring	Responsible Agent for Monitoring	Frequency of Measurement	Reporting Mechanism	Threshold or Existing Standard	Recommended Action when Threshold is Exceeded
			Availability of Hand Sanitizers Availability of Handwashing stations, water and soap						
Potential increase in Sexual Exploitation and Abuse (SEA), Sexual Harassment (SH) and Violence Against Children (VAC)	GBV, SEA, SH AND VAC/VAC incidents	Entire project area	Number of GBV, SEA, SH AND VAC/VAC cases recorded	Observation Document review/list of GBV, SEA, SH AND VAC/VAC cases-GM monitoring log	Enviro Solve PIU and CLO Social Worker Botswana Police Services	Daily	ESMP monthly monitoring reports PIU monthly reports Community liaison monthly report	Requirement of ESMP, EA Act 2010 Requirement of GM GM Requirements	Assess requirement and comply with the ESMP GM must be properly used and all GBV, SEA, SH AND VAC/VAC cases recorded and properly resolved
WATER RESOURCES MANAGEMENT									
Groundwater Contamination	Water quality: total petroleum hydrocarbons (Benzene, Hexane, Toluene, Xylenes, Naphthalene and Fluorine)	Around the construction and decommissioning on sites	Changes in pH, TDS, major ions, benzene, hexane, toluene, xylenes, naphthalene and fluorine	Grab samples, laboratory analysis for Total Petroleum Hydrocarbons and Chemistry	Contractor Engineer SHE	Monthly	Environmental Officer SHE officer WUC	BOS 32:2009 specifications for drinking water and Hydrocarbons and chemistry should not exceed baseline levels	Areas contaminated with oils, fuels and greases should be treated immediately to minimize such incidents. Where there are serious spills the area should be cordoned off

Potential Environmental Impacts	Parameters to be Monitored	Location	Key Performance Indicator	Method of Monitoring	Responsible Agent for Monitoring	Frequency of Measurement	Reporting Mechanism	Threshold or Existing Standard	Recommended Action when Threshold is Exceeded
									while the spill is being contained.
LAND USE MANAGEMENT									
Encroachment of pipe infrastructure into people's residence/properties due to inadequate servitudes	Encroachment to properties Tribal Land Act 1968, Section 33 (2) provides that compensation is payable when land is required for project and the acquiring body is financially responsible for all aspects of the project; this includes payment for compensation to claimants. The displaced may be granted the right to use other land available and is entitled to adequate compensation.	Project villages	Number of residences/properties or roads affected by excavation Period of blockage	Observation Time keeping for blockage period	Enviro Solve Site Agent Sowa Town Council and Tutume Sub-District Council	Daily during construction phase	ESMP monitoring report Site Agent report	Tribal Land Act No blockage for more than 12 hrs	The contractor should backfill to unblock access
SOIL MANAGEMENT									

Potential Environmental Impacts	Parameters to be Monitored	Location	Key Performance Indicator	Method of Monitoring	Responsible Agent for Monitoring	Frequency of Measurement	Reporting Mechanism	Threshold or Existing Standard	Recommended Action when Threshold is Exceeded
Soil erosion	Upland soil surface erosion, other than gully erosion	All excavated areas/working areas along the pipeline routes	Depth of eroded soil	Number of erosional features visible on site Measurement with a graduated stick	Enviro Solve Site Agent	Weekly	ESMP monitoring report Site Agent report	No new erosional features initiated on site	Contractor should rehabilitate damaged/eroded areas. Contractor should attend to areas which need attention as directed by the Environmentalist.
ECOLOGICAL MANAGEMENT									
Loss of vegetation (clearing of rights-of-way for water infrastructure construction)	Vegetation loss	Pipeline route and other construction sites	Length of new pipeline along existing liner structures Length of pipeline along wellfields-RWT-WTP water line route Amount or area of vegetation cleared. Amount and number of species of conservation concern destroyed.	Distance measurements (and GIS) Distance measurements (and GIS) GIS and mapping (global positioning system) Species identification and frequency count	Enviro Solve DFRR	Routine (daily, weekly, monthly)	ESMP monthly monitoring report	Herbage Preservation Act	Instruct contractor to confine vegetation clearance to the pipeline and other infrastructure footprints.

Potential Environmental Impacts	Parameters to be Monitored	Location	Key Performance Indicator	Method of Monitoring	Responsible Agent for Monitoring	Frequency of Measurement	Reporting Mechanism	Threshold or Existing Standard	Recommended Action when Threshold is Exceeded
Increased risk of illegal procurement of biodiversity	Illegal procurement of biodiversity	Entire project area	Number or percentage of staff trained Number of cases of illegal acquisition of biodiversity Man days of security personnel spent at the project Number of poaching cases reported to DWNP & DFRR Trends & patterns of poaching (species, distribution and frequency)	Resource persons, training materials & attendance register Spot checks, informants, poaching registers Formal agreements with security agencies DWNP and Police poaching registers and occurrence books Private consultant, poaching monitoring registers, monitoring systems, reporting procedures	Enviro Solve DWNP Botswana Police Services	Routine (weekly, monthly) Routine and opportunistic	ESMP monthly monitoring report DWNP, BPS	Wildlife Conservation and National Parks Act	Contractor should undertake awareness training on illegal procurement of biodiversity
Elevated risk of increased incidents of negative human-	Human wildlife interaction	Entire project area	Amount of waste treated onsite and recycled or sold	Tonnage or number of trucks	Enviro Solve Site Agent DWNP	Routine (daily/weekly) Routine & opportunistic	ESMP monthly monitoring report	Wildlife Conservation and National Parks Act	Instruct the contractor to clean up the site

Potential Environmental Impacts	Parameters to be Monitored	Location	Key Performance Indicator	Method of Monitoring	Responsible Agent for Monitoring	Frequency of Measurement	Reporting Mechanism	Threshold or Existing Standard	Recommended Action when Threshold is Exceeded
wildlife interaction (HAC)			Number or percentage of staff trained Frequency and distribution of repairs Number and types of warning signs displayed Diversity and frequency of habituated and problem animals Number of HAC or habituated animals reported to DWNP	removing waste Resource persons, training materials and attendance register Repair & maintenance log sheets or job cards Number of warnings signs sustained over construction phase Private Consultant, HAC and Habituation log sheets, structured surveys and opportunistic DWNP occurrence books & HAC registers	Botswana Police Services		DWNP		Provide training on HAC for employees
Wildlife habituation and modification of behaviour	Changes in wildlife distribution and mortality	Entire project area	Frequency and distribution of water leaks	Structured routine surveys (e.g.	Department of Wildlife and National Parks	Routine and Opportunistic (reports)	DWNP Private Researchers	Wildlife Conservation and National Parks Act	Leakages should be identified and repaired as soon as possible

Potential Environmental Impacts	Parameters to be Monitored	Location	Key Performance Indicator	Method of Monitoring	Responsible Agent for Monitoring	Frequency of Measurement	Reporting Mechanism	Threshold or Existing Standard	Recommended Action when Threshold is Exceeded
			Frequency and distribution of repairs Wildlife distribution (species, frequency, time) Frequency and distribution of wildlife mortality (species, location and time)	spoor count, camera traps) Number of reported road accidents involving wildlife		Structured (Daily, weekly or seasonally)			
Increased risk of wildlife mortality due to pitfalls	Injuries and mortality due to pitfalls	Pipeline routes	Number or record of injuries and mortality Distance of open trenches	Daily inspections of trenches	Department of Wildlife and National Parks Botswana Police Service	Daily	DWNP ESMP monthly monitoring report	Wildlife Conservation and National Parks Act	Revise and reduce the amount/distance of open trenches and backfill trenches as soon as possible
Increased incidents of veldt fires	Veldt fires	Entire project area	Number or percentage of staff trained Fire reporting procedures (document) Fire incidents filed with DFRR, BPS or DWNP Frequency, distribution of veldt fires and area burnt	Resource persons, training materials and attendance register Private consultant, official fire response and reporting procedures	Enviro Solve DFRR DWNP BPS	Opportunistic Routine (daily & monthly)	ESMP monthly monitoring report DFRR. DWNP. BPS ADIS-MERAKA subscription	Herbage Preservation Act Wildlife Conservation and National Parks Act	Contractor should provide awareness training on how to prevent veldt fires and how to fight them

Potential Environmental Impacts	Parameters to be Monitored	Location	Key Performance Indicator	Method of Monitoring	Responsible Agent for Monitoring	Frequency of Measurement	Reporting Mechanism	Threshold or Existing Standard	Recommended Action when Threshold is Exceeded
				Fire reports from DFRR, BPS & DWNP Subscribe to fire monitoring systems (e.g. Advanced Fire Information System – www.afis.meraka.org.za) for daily data on fire risk assessments, active fires and monthly burnt area					
Pollution of the natural environment	Pollution of the environment by waste	Entire project area	Waste management system and protocols (document) Amount of waste sorted and managed / correctly disposed off onsite Amount of waste material recycled or re-used Amount (tonnage or number of	Direct observation Measurement of weight or number of truck loads/trips Direct measurement; tonnage, length, volume, truck loads etc) Measurement of weight or	Enviro Solve Site Agent DWMPC	Routine (weekly)	ESMP monthly monitoring report DWMPC Sowa Town Council and Tutume Sub-District Council Private Waste Management Companies	Waste Management Act	Contractor should halt works and undertake site clean-up

Potential Environmental Impacts	Parameters to be Monitored	Location	Key Performance Indicator	Method of Monitoring	Responsible Agent for Monitoring	Frequency of Measurement	Reporting Mechanism	Threshold or Existing Standard	Recommended Action when Threshold is Exceeded
			trips) of waste disposed of at designated sites Amount paid in levies and/or number/length of contract with private companies Waste monitoring system (document) Amount of waste handled, managed, and disposed off properly	number of truck loads/trips Receipts (waste manifests) and contracts Document, with all waste monitoring procedures					
ARCHAEOLOGICAL AND CULTURAL MANAGEMENT									
Uninformed destruction of Archaeological/Cultural Historical Resources	Presence of Archaeological/cultural/historical resources	Entire project site	Number of days archaeological monitoring is undertaken Chance find procedures invoked	Archaeological Awareness Programme/ Induction Archaeological Watching Brief and Monitoring Chance Finds Reports	Enviro Solve (Archaeologist) Site Agent Department of National Museum and Monuments	Daily	Archaeologist Monthly monitoring report to DNMM	Monuments and Relics Act	Work should be stopped immediately until the archaeological artefact is cleared or salvaged
OPERATION AND MAINTENANCE PHASE									
Improved livelihoods due	Water availability	Entire project area	Number of complaints from the community	Review of register of complaints	WUC	Monthly inspection of system	Monthly monitoring	Complaints of water shortage from	Assess project requirements

Potential Environmental Impacts	Parameters to be Monitored	Location	Key Performance Indicator	Method of Monitoring	Responsible Agent for Monitoring	Frequency of Measurement	Reporting Mechanism	Threshold or Existing Standard	Recommended Action when Threshold is Exceeded
to water availability			Number of new beneficiaries	Inspection of the water supply system			by WUC operators	the community	and implement them fully
Groundwater over-mining (Depletion)	Lowering of the water table in the BHs Reduction of water in surface water bodies in the area Land subsidence Water quality	Wellfield	Water table Amount of surface water in water bodies Geodetic marks Water quality	Measuring water table in BHs and surface water bodies, monitoring geodetic markers. Collecting and testing water quality,	WUC	Monthly inspection of system	Monthly monitoring by WUC operators	Groundwater depth in operating boreholes reaching below dangerous levels, or below water pumping zone. Changes in water quality	Immediate stoppage of groundwater pumping to allow for recharge
Water supply disruptions due to vandalism/theft of infrastructure	Water leakages Damage to project infrastructure	Along the water pipelines and other project components	Water leaks Damaged infrastructure	Monitoring telemetry and SCADA system Physical inspection of project infrastructure	WUC	Daily monitoring of telemetry and SCADA system Weekly physical inspections	Monthly monitoring by WUC operators	Changes in water pressure and shortage of water	Repair damages to infrastructure immediately Replace damaged infrastructure immediately

ANNEX 15: CONCEPT SKETCH OF THE PROPOSED BRINE EVAPORATION PONDS

CONCEPT SKETCH OF THE PROPOSED BRINE EVAPORATION PONDS

